How to Avoid Buying an Outmoded Mac: Page 25

MACWORLD

THE MACINTOSH® MAGAZINE

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REVIEWED PAGE 134

SPECIAL REPORT

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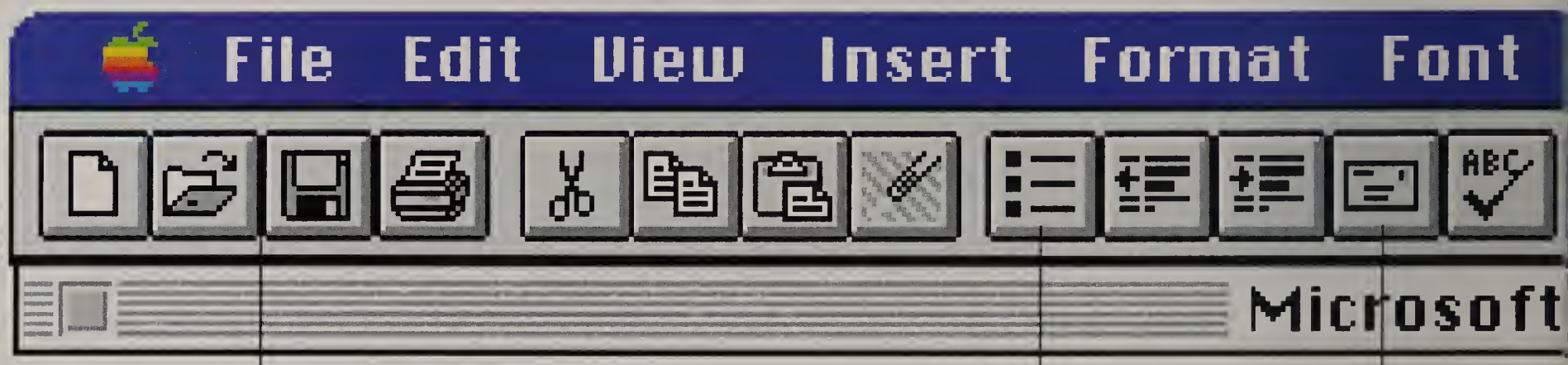
HOW WELL DOES IT WORK?

Color PowerBook 165c

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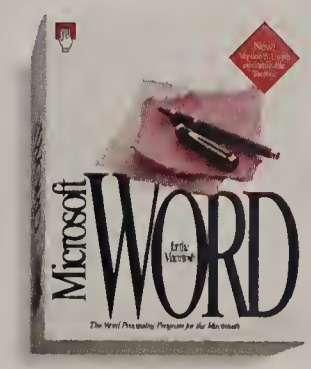


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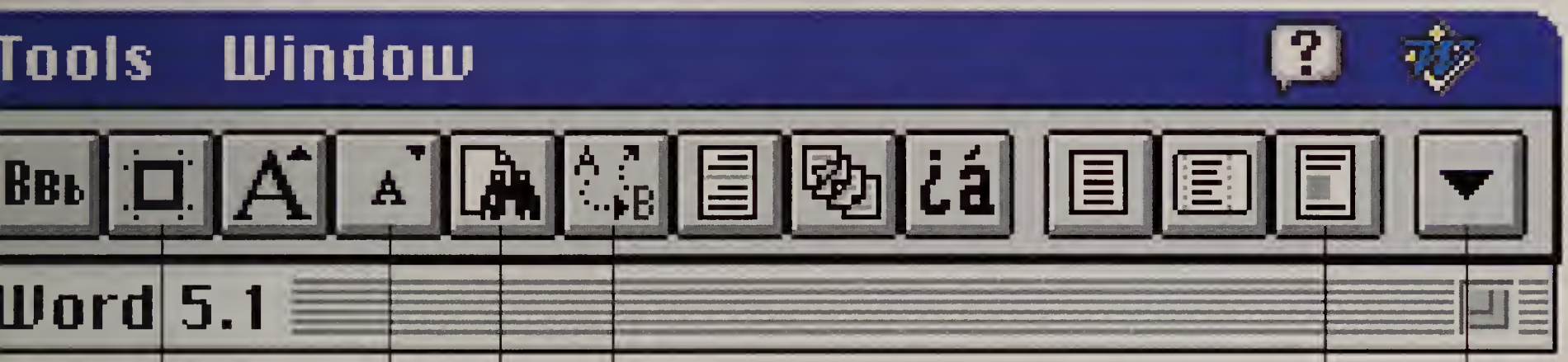
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On the Cover

WITH ITS REASONABLE PRICE AND SPEEDY PERFORMANCE, THE LC III MAY BE APPLE'S BEST-BARGAIN MAC YET. OUR COMPREHENSIVE REVIEW BEGINS ON PAGE 134. (PHOTO BY PAUL FRANZ-MOORE; SCREEN IMAGE BY JIM LUDTKE.

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Bosses with X-Ray Eyes 118

BY CHARLES PILLER How prevalent is electronic monitoring of employees? *Macworld* examines the state of digital surveillance in the workplace.

Privacy in Peril 124

BY CHARLES PILLER Computer technology's power to instantly access huge volumes of personal data has seriously eroded our protection against invasion of privacy.

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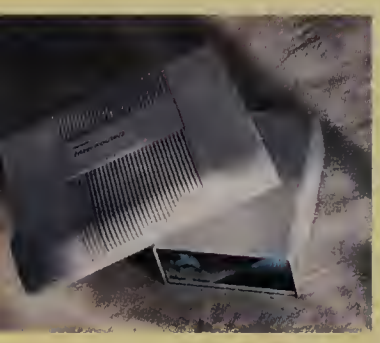
BY JAMES A. MARTIN The growing popularity of multimedia and Photo CD has spawned a new generation of CD-ROM drives that promise greater speed. But will you really notice the difference? Macworld Lab tests nine mechanisms to find out.

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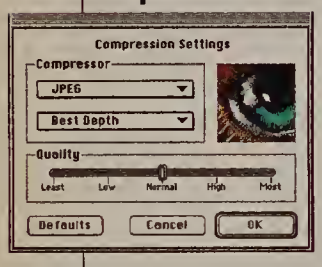
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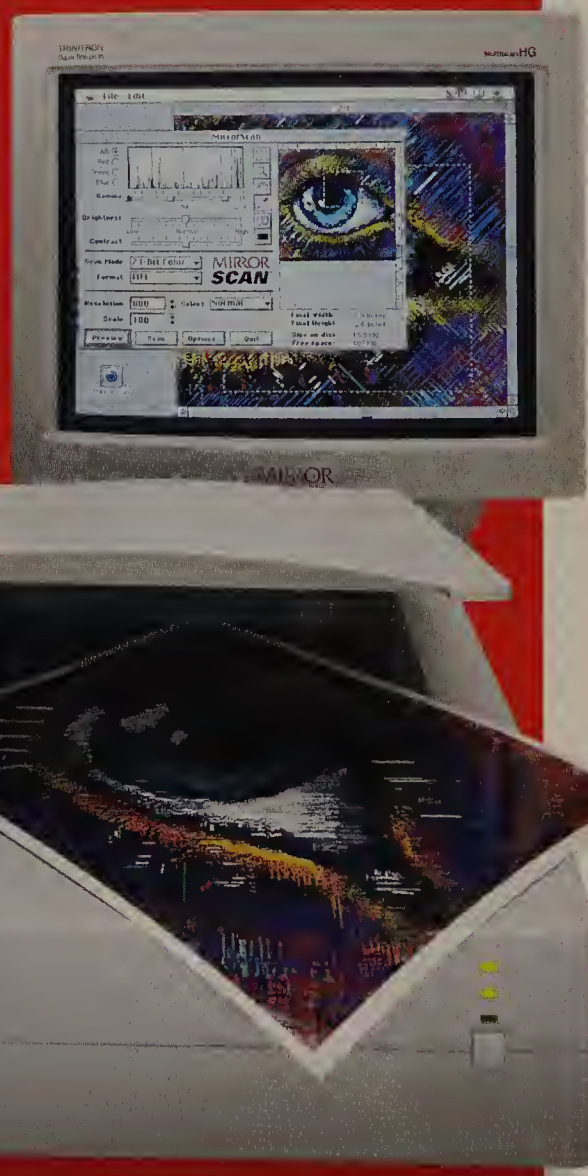


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*[1]April 1992, [2]July 1992, *Requires an available NuBus slot.*
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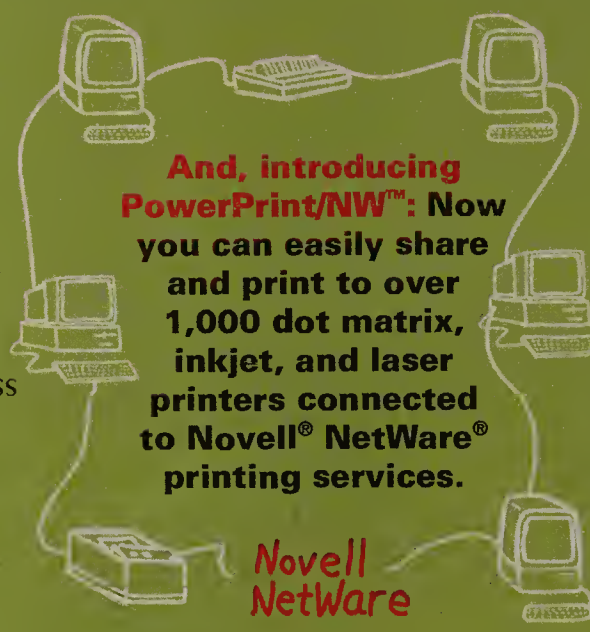
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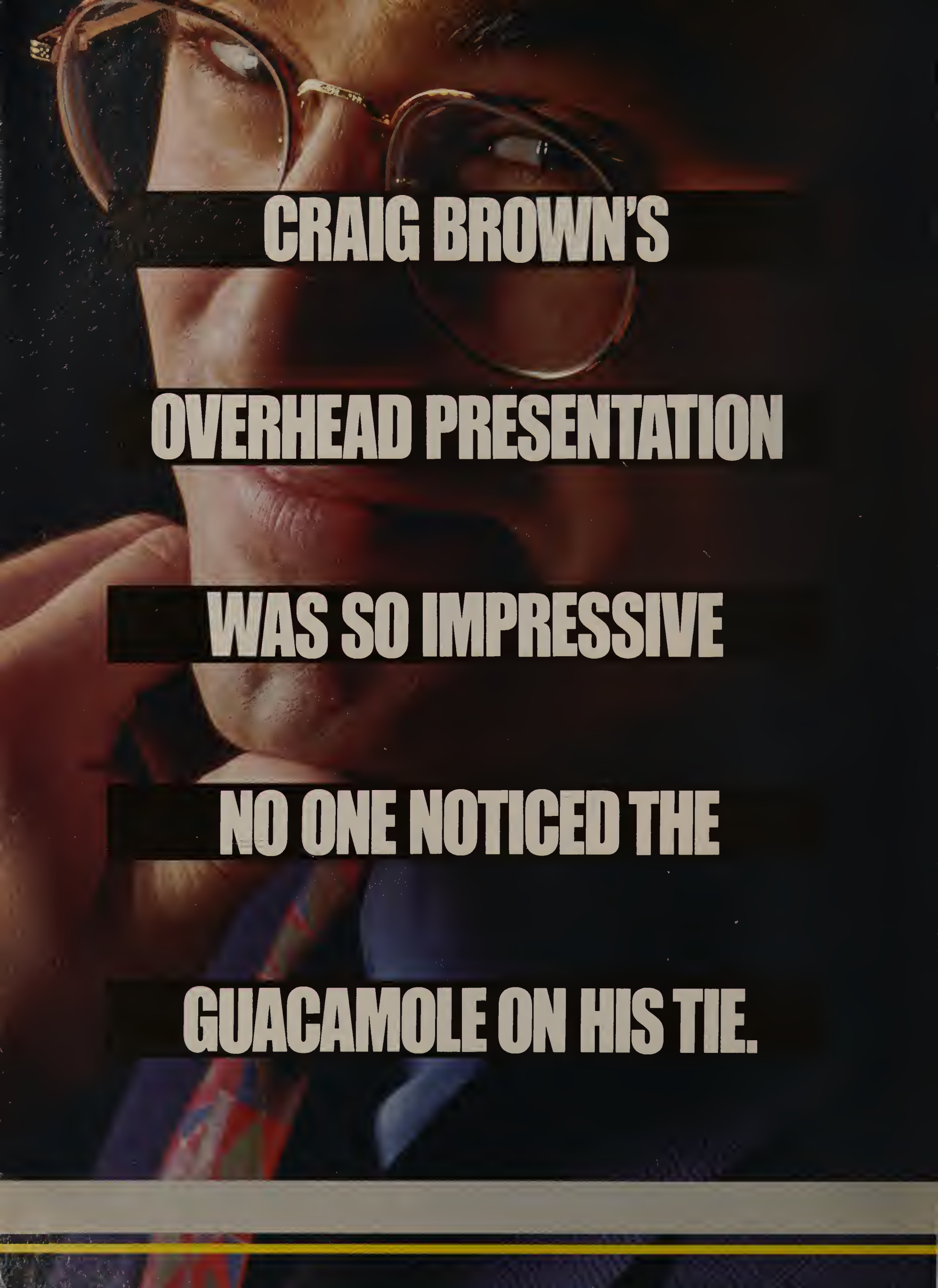
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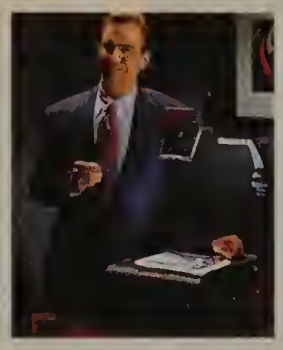
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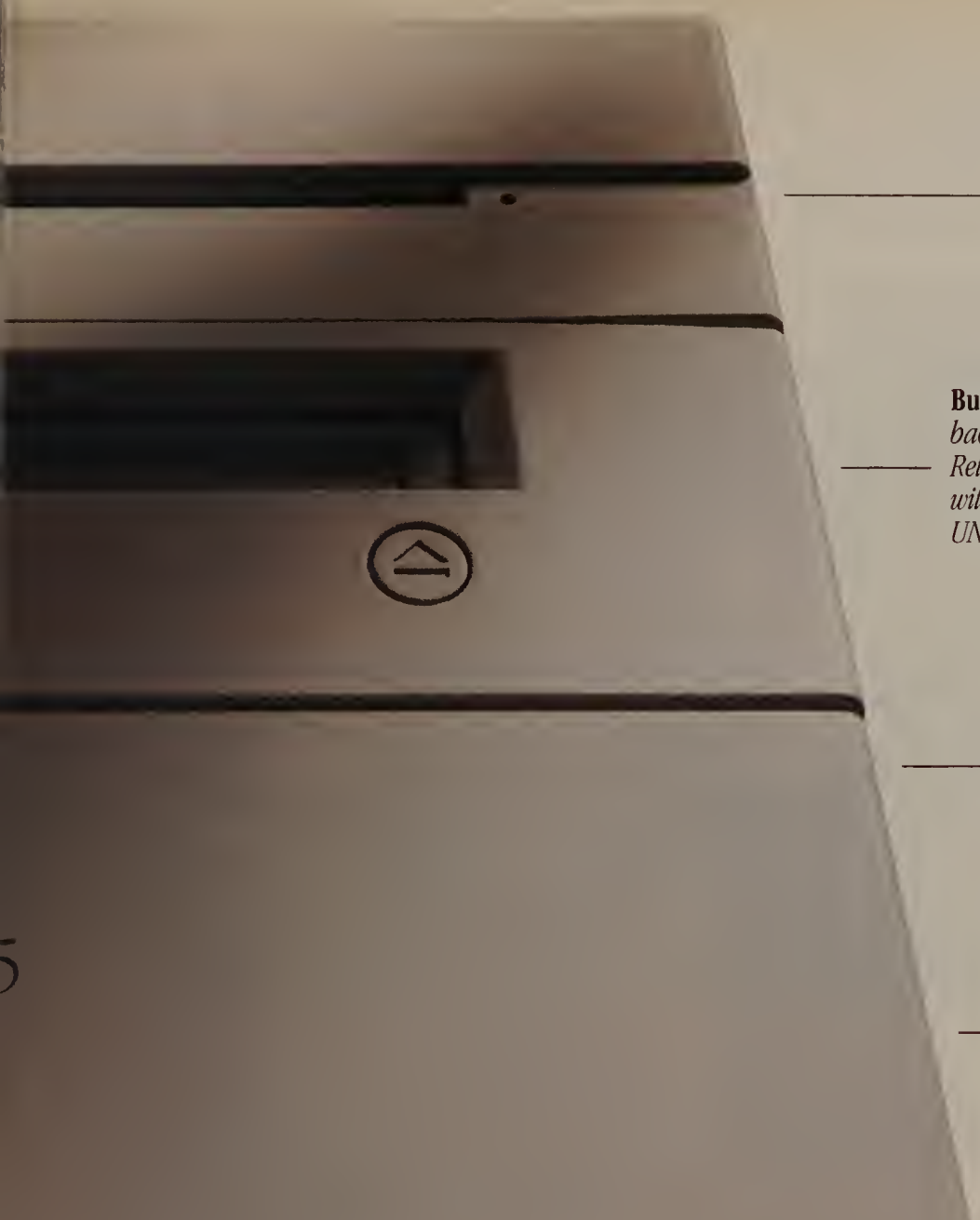
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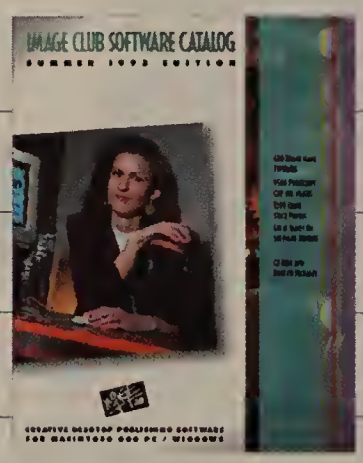
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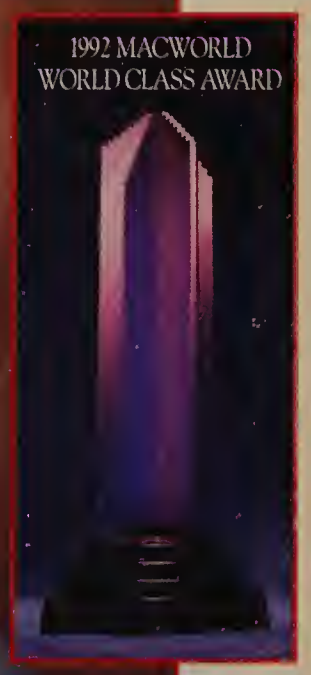
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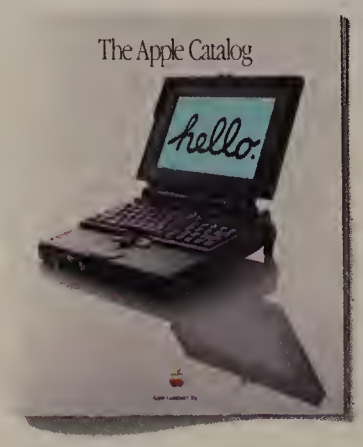
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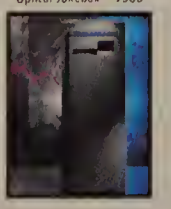
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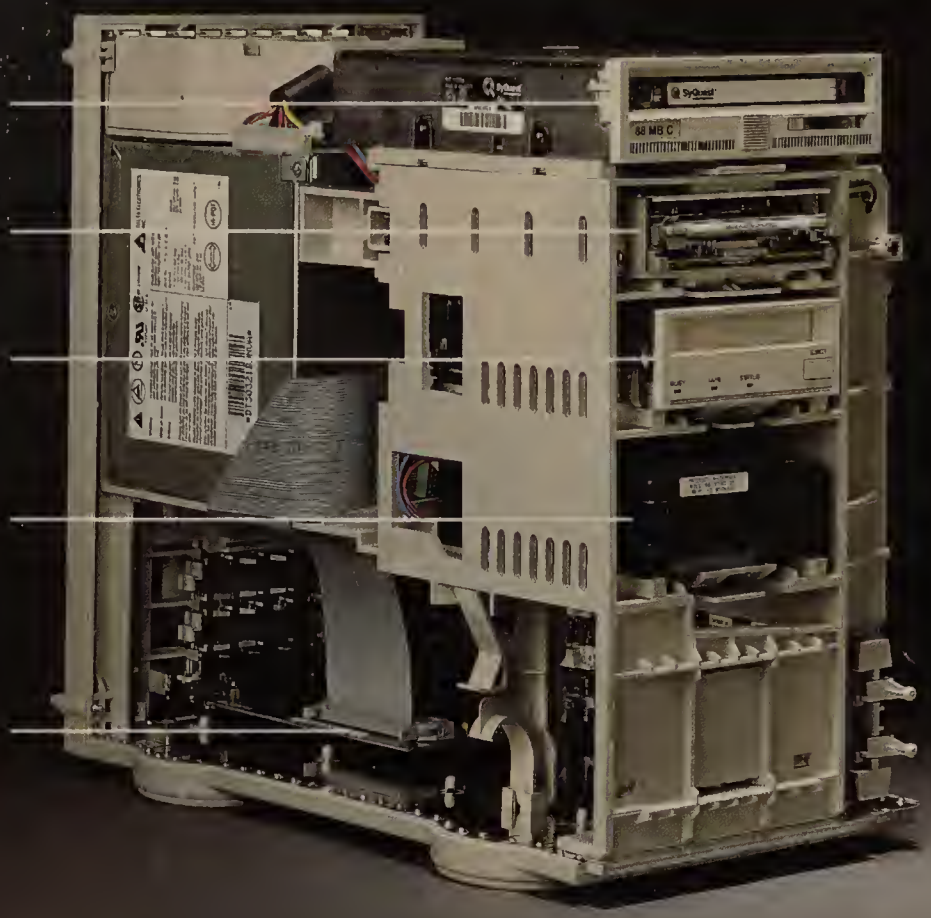
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Disk arrays can improve performance up to 400 percent over standard drives. Combine MicroNet's Raven·800 disk array with the speed of the Quadra 800 and you have an unbeatable system for applications such as PhotoShop, fileservers, and full rate digital video and audio recording.

Cost effective two drive disk arrays are available in capacities of 1030 to 5560 MBytes and are expandable to more than 38 GBytes. MicroNet also offers single disk drive systems that can be upgraded to a Raven·800 disk array at a later date.



Built on award winning technology, the Raven·800 takes full advantage of Apple's existing hardware. One drive connects to the native SCSI port of the Quadra, and one connects to a MicroNet NuPORT-III, SCSI-2 host adapter. Together, these two drives create a fast, parallel, 16-bit data path.

MicroNet has designed a complete family of internal storage systems for the Quadra 800. Included are SyQuest removable systems, rewritable optical drives, and DAT backup systems. All are shipped complete with custom designed bezels.

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MacBulletin

LATE-BREAKING NEWS

PowerBook Duo prices fell between 10 and 18 percent on selected models. The Duo 210 4/80 went from $2249 to $1839, the Duo 230 4/80 from $2609 to $2299, the Duo 230 4/120 from $2969 to $2659, and the Duo 230 4/120 with modem from $3219 to $2899.

New Apple Support: Apple USA is launching a broad customer-support initiative that includes toll-free telephone support for all Mac owners and free on-site or at-home repair of Macs still covered under the standard one-year warranty. The toll-free support number is 800/767-2775; to find a Mac repair shop participating in the on-site service, call 800/538-9696.

America Online cut prices in half in a bid to increase its share of online-service subscribers. The company (703/448-8700) now charges a $9.95 monthly service fee, which includes five hours of connect time, and $3.50 for every subsequent hour, including peak-usage hours.

Document Interchange Coming: Adobe Systems (415/961-4400) has begun publicly demonstrating Acrobat, a technology for distributing computer documents that can be read and navigated without the applications that created them. Adobe expects to begin shipping the first Acrobat products in June. Looming competitors include No Hands Software's (415/321-7340) Digital Paper (see "No Paper, No Barriers," *Macworld News,* May 1993), expected this summer, and Frame Technology's (408/433-3311) FrameViewer, which Frame plans to expand to work with documents not created in FrameMaker.

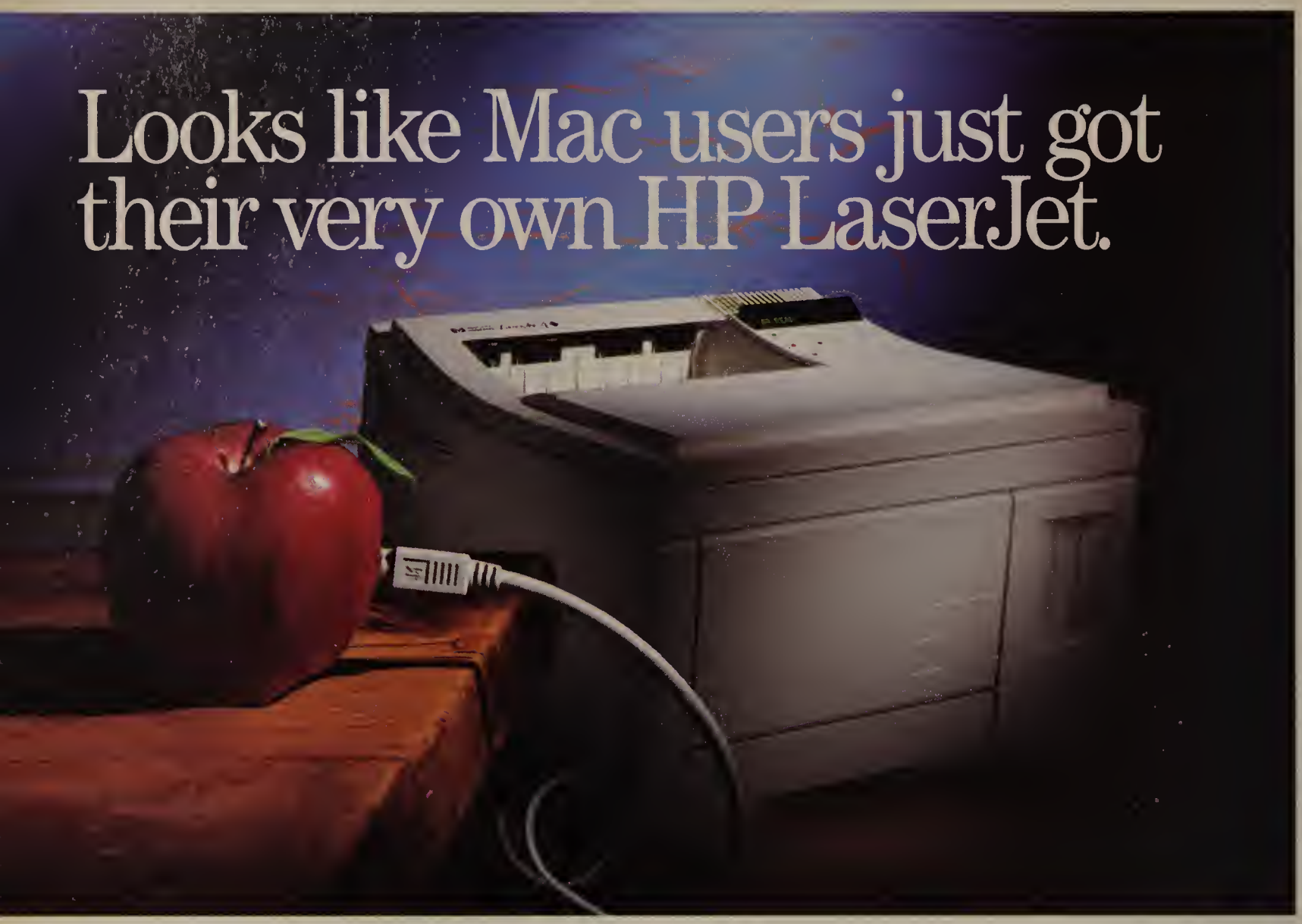
ChipSoft Absorbs Competitor: MacInTax publisher ChipSoft (619/453-4446) has acquired MECA Software (203/256-5000), which publishes the competing TaxCut. ChipSoft obtained MacInTax in an earlier acquisition and then stopped publishing its own TurboTax. ChipSoft says this time it plans to keep both products on the market, positioning TaxCut as a low-end product and MacInTax for the high end.

Apple Courting Windows Market: Apple is modifying its tactics to gain a bigger slice of the Windows printer and scanner market. The LaserWriter Pro 600 and the Select 310 are shipping with 40 Windows TrueType fonts plus software that automatically switches between PostScript and PCL, while the OneScanner comes with an ISA SCSI interface. Apple is also including Windows buyers in its new support and warranty program (see "New Apple Support").

Apple-Microsoft Suit: A U.S. district court judge further weakened Apple's "look-and-feel" suit against Microsoft by reducing the number of screen items that can be examined for possible infringement. Initially, Apple had claimed infringement on over 200 items, but the recent decision has left Apple with only 3 possible items.

Apple posted a 15 percent increase in net earnings for the second quarter of fiscal 1993 versus the same quarter in 1992. Net income, however, fell to $110.9 million from last year's second-quarter mark of $135.1 million. Apple's gross margin percentage dropped because of price cuts and new product introductions, according to Apple. m

Looks like Mac users just got their very own HP LaserJet.

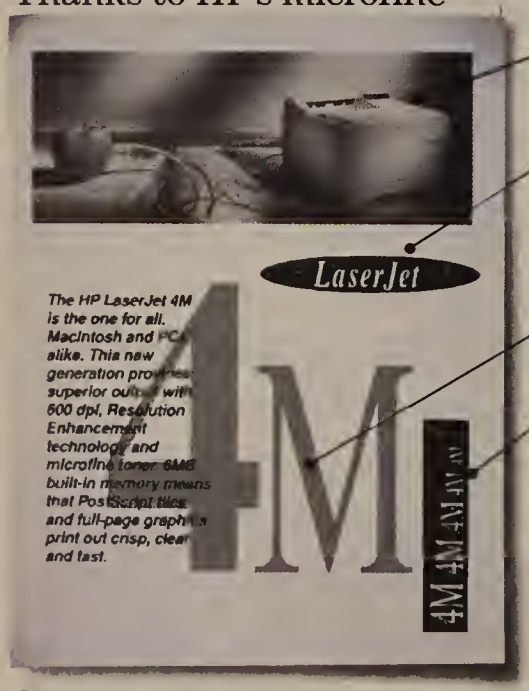


The new generation HP LaserJet 4M printer.

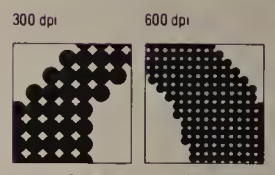
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The Macintosh Book of the Dead

BY ADRIAN MELLO

AN OBSOLETE MAC IS NOT A pretty picture, especially if you're the one who just bought it. The tragedy of the Macintosh IIvx points out some sobering lessons to be learned from the poor souls caught buying obsolete Macs. In mid-October of last year, Apple announced the Mac IIvx along with several other Macs. In February, the company entirely revamped its midrange product line by introducing two new models, the Centris 610 and Centris 650. Apple also dropped the price of the base Mac IIvx by a whopping $1050, to $1899—only four months after the machine's introduction.

Owners who had just purchased Mac IIvx's felt betrayed by the turn of events. Not only had the IIvx moved from the top to the bottom of the midrange, it had depreciated by more than a third of its purchase price overnight. I agree with many of our readers, whose letters propose that Apple offer a more reasonable Centris 650 upgrade for those who bought a IIvx early on. Instead of asking them to pay $1599 for a 650 system board upgrade, Apple should soften the blow by meeting them halfway with an upgrade rebate of $800.

I have witnessed many passing generations of Macintosh models, and each new generation of Macs is greeted with the sorrow of buyers who had recently purchased what they had thought was the latest Mac. These buyers pay a financial and psychological price for the cruel march of technological improvement. But the IIvx's is the most bitter passing that I recall—both for its buyers, and for the magazines like *Macworld* that recommended it. All of us thought it was a good deal at its introduction. Now, most of what's likely to be its short life will be spent in death throes.

Once the LC III and the Centris 610 and 650 were introduced, the IIvx really didn't offer a competitive mix of price, performance, and features. The early notion was that users would have a choice between the IIvx's expandability and the Centris 610's performance. Although this sounds reasonable in theory, most users who are serious about expansion also want an extra margin of performance to grow into as they buy more in peripherals, memory, and boards. For all practical purposes, expansion capability and performance go hand in hand.

The problem of the IIvx is that it should never have been introduced at its original price, considering how rapidly the LC III and the Centris models followed. Obsolescence is unavoidable if you buy personal computers. Every year you can get a better, faster personal computer for less money than you could the year before. Inevitably, some buyers get caught purchasing a new Mac that soon seems less than a bargain as newer models are introduced. Users can, however, strive to avoid premature obsolescence, by looking ahead as much as possible.

How do you spot models on the verge of obsolescence? Here are some simple rules. Think of them as the Five Ignoble Truths. As with all things, take them with a grain of salt, and proceed cautiously.

Truth 1: Life Is Short

BEWARE OF MODELS THAT HAVE BEEN on the market for more than a year, sometimes less. Having the brief life span of a butterfly, most Mac models are quickly replaced by their offspring. Witness the Classic, which was replaced by the Classic II, which in turn was outmoded by the Color Classic. Likewise, look at the quick regeneration of the LC platform. In less than two and one-half years both the LC and the Classic lines have undergone three permutations. In each case, you can buy more for less than when the product line's progenitor was born.

But for the first time that I recall there was a true abomination in the land. The IIvx was alive only four months before it proved unviable at its original price. The irony is that the IIvx passed truth test number 1. The quick price drop of the IIvx led to suffering and a feeling of betrayal for otherwise prudent buyers.

Truth 2: Each Model Must Have Room to Breathe

IF YOU PUT TWO OR THREE Macintosh models in the same price envelope, at least one of them is bound to suffocate. There's pressure on any model that has one or more comparable models selling for within $500 of its base price. Ironically, the IIvx passed this test too. The IIvx appeared to be delivering a death blow to the IIci and IIsi. No one—outside of Apple—suspected that the IIvx would get blown away by the Centris series and the LC III within a mere four months.

Under this truth test, the Classic II is looking suspiciously wan. The PowerBook 145 also seems to fit into this category because the 160 offers built-in external video support for only a few hundred dollars more. Finally, the Centris 610 is a question mark, hovering a mere $500 above the LC III.

Truth 3: The Meek Perish Quickly

. . . BEFORE THEY CAN INHERIT. BEware any model that does not provide a serious boost in performance over the model it is apparently replacing. The IIvx fit here. This would have been the only criterion, in fact, by which to avoid it, since the Centris line had not been announced at the time.

The IIx was another example of a machine that didn't offer that much more for its speed. Should buyers have known better? Not necessarily; the Classic was no faster than the Mac SEs that it replaced, although it was much less expensive. The Color Classic is no faster than a Classic II—even though its cousin, the LC II, has been superseded by the LC III. Despite having a flashy color monitor and convenient expansion drawer, the Color Classic needed a dose of Geritol upon introduction.



The Five Ignoble Truths of Obsolescence

One corollary to Truth 3 might be Processor Numerology Reveals Fate. This corollary states that any model sporting a processor more than one generation older than the most recent processor will soon perish. Once the fifth-generation 68040 processor was introduced in the first Quadras, the first-generation 68000-based Classic and the second-generation 68020-based LC were soon replaced by 68030 versions, namely the Classic II and the LC II.

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A second corollary to Truth 3 is Higher-Ups Must Be Faster. This means that any supposedly higher-end model that is slower than a lower-end model won't long survive. With this corollary in mind I will merely mention that the Quadra 950 doesn't appear to be quite as fast as the Quadra 800. This doesn't mean that the less-expandable 800 will cause the 950's extinction—only that a future system that could kill the 950 will not be hard to design.

A third corollary to this truth is Flaws Can Be Fatal—any model with a disappointing feature or disappointing technology may not live long and could embarrass you. An outstanding example is the Macintosh Portable, which was simply too big and heavy. The PowerBook 165c seems doomed under this corollary because of its sad, passive matrix screen technology. Don't be surprised when Apple introduces an active matrix color display that makes the 165c obsolete even though the 165c may still cost significantly less.

Truth 4: Death Wears an Old Robe

ANY MODEL THAT DOESN'T REFLECT the current state of industrial design is in danger. Macs are style-conscious. This year's Macs are wearing a matrix of small air holes, small pachyderm feet, overhanging front bezels, and occasionally, high monitor collars. An exception is the LC III, which still wears last year's industrial fashion but, like an oxford cloth shirt, is in no danger of becoming obsolete because it provides tremendous value. The Classic II, however, is clearly passé.

Truth 5: The Moment of Death Passes Unseen

BECAUSE WE'RE ALL MORTAL, WE'VE all no doubt asked the question What's it like for an obsolete Mac at the moment of death? It's not glamorous—obsolete Macintoshes usually just fade away. They certainly never get a 21-gun salute. Occasionally, Apple announces quietly that it is killing off the machine. Other times the machine is "repositioned"—almost always a prelude to impending doom. This is the likely fate of the IIvx, which quickly migrated to the bottom of the Centris line without even being given the nameplate of its adoptive family.

Obsolete Macs are expected to slide discreetly off Apple's price list into oblivion. Many distinguished Macs have gone this route, including the venerable Mac II, the SE, and the IIci. The Mac IIvx, the LC II, and the Classic II are bound to follow the same ignominious path to the Macintosh graveyard. Of course, out of the ashes will come new life.

Next Month: less depressing stuff. **m**

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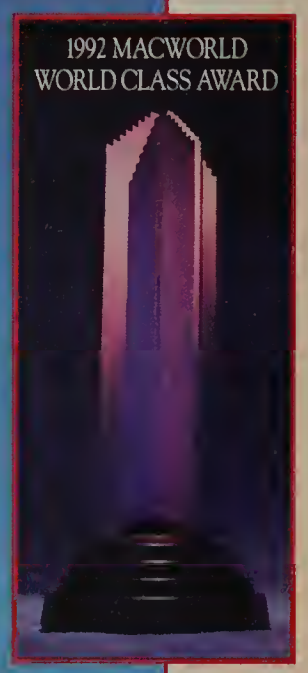
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Letters

JULY 1993

No Shirt, No Shoes, No Service

I AM USING QUARKXPRESS TO WRITE this letter. It will, regrettably, be my last use of the best DTP program around.

I am a newly homeless person in south Dade County, Florida. My house took a direct hit from Hurricane Andrew, destroying all but the four outside walls and a small portion of the roof. After replacing our Macs and assorted peripherals, my wife's first call was to Quark to replace her favorite program. She was devastated by their attitude and response, which was, in essence, "You have insurance—go out and buy a new copy." What happens to our registered, serialized copy? Are we purged from the files of legitimate owners? "Oh, no," she was told, "We will be glad to send you an update, for $95." My wife capitulated and purchased the update, which turned out to be four disks and a manual addendum. These, of course, are totally useless as our original disks are somewhere in the Everglades.

At the same time as my wife was suffering this ludicrous injustice, I was calling Symantec customer service to replace Norton Utilities. I explained our plight, and the lovely person who took my information queried her computer, found that I owned three Symantec products, asked if I was able to receive mail at my current address, and told me that new disks and documentation for all three programs would be shipped the following day!

Philip and Brenda Mitchell
Miami, Florida

WHEN MY SUPERVISOR SHOWED me the letter from Aldus requiring the purchase of a technical-support plan, I felt resentful of the policy change, but grudgingly signed the purchase form.

Weeks later I discovered, upon calling Aldus technical support, that our agreement had not arrived. It could have been a panic: my bosses leaving for a presentation in Geneva, their slides half-finished, and our support agreement missing.

While gently reminding me that a support purchase was required, the Aldus support tech provided the information I needed to complete my files.

This brings me to QuarkXPress. Included among the documentation is a technical-support purchase agreement that a new user can send in, if they see it. I discovered only upon calling Quark technical support that a support purchase agreement was required. I provided the support tech with our fax number to receive the necessary forms, and was subsequently floored by Quark's refusal to answer even one question in the interim. My work ground to a screeching halt and remained there for a lengthy hiatus. I understand that charging for tech-support recovers costs, but there are many examples of professional cooperation that make the system work better for everybody.

Donna Odle
Galveston, Texas

Quark responds: "To handle situations like Ms. Odle's, Quark has a $25 one-month service plan, which can be charged over the telephone—technical-support questions may then be answered immediately. Ms. Odle elected not to purchase this plan, and instead signed up for our one-year service plan two weeks later.

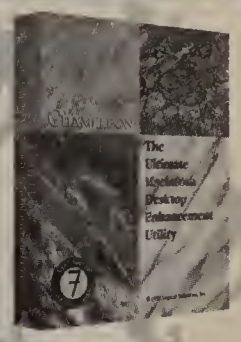
"In the case of the Mitchells, Quark does not have a replacement policy covering hurricanes. Other QuarkXPress users who have lost hardware and software though natural disasters have had both replaced through insurance claims. Did Apple Computer provide free replacement for their lost hardware? Did IDG provide free replacements for their back issues of *Macworld*?"

Eeek! An Aardvark!

I ENJOYED READING JAMES MARTIN'S article "Top 10 CD ROMs" in the March 1993 issue, particularly the review of Arthur's Teacher Trouble. But James, you called Arthur an aardvark! You'd

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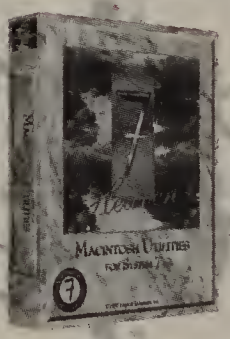
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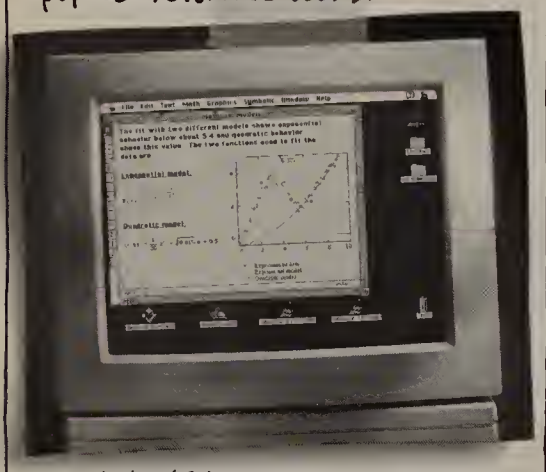
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CORRECTIONS

The version of MyMailList reviewed in February 1993's The Desktop Critic *was MyAdvancedMailList, not MyMailList, Quick and Easy version.*

The review of Alice (East West Communications, 213/848-8436) in The Desktop Critic, *May 1993, was incorrectly titled "Alice in BlendloLand."*

"Gauging Video Speed" ("24-Bit Color Graphics," February 1993) lists test results for a SuperMac Spectrum/24 Series III with a $499 piggyback board. Those results are for the SuperMac Spectrum/8•24 PDQ. There is no piggyback option for either display board.

In "Building an Expandable Network" (May 1993), Underwriters Laboratories (UL) was incorrectly identified as United Laboratories.

The May review of MicroTouch Systems' UnMouse incorrectly recommends the product for use with a PowerBook. The UnMouse is not a low-power ADB device and therefore will not draw sufficient power from the PowerBook's ADB. MicroTouch provides an auxiliary power supply for such situations.

In the table "Find the Right Feature Mix" ("Ink-Jet," May 1993), the CJ10 color copier was incorrectly listed as a Canon Computer Systems product. The CJ10 is made by Canon U.S.A.'s Graphic Systems Division (516/488-6700).

think that the Senior Associate Editor/Features for *Macworld* would know a mouse when he sees one!

Tony Nunez
Kennesaw, Georgia

After weeks of painstaking research (and a couple of phone calls to Brøderbund) we have determined beyond a shadow of a doubt that Arthur is, in fact, an aardvark.—Ed.

Macworld Interactive

COMPLIMENTS, *MACWORLD* (AND David Pogue), on uploading actual sound recordings of the Yamaha TG100 MIDI sound module (*Reviews*, April 1993). I signed on to AOL, downloaded the sound file, and got more information on the sound quality than Mr. Pogue (even with his outstanding writing skills) could ever communicate via the magazine.

This is the kind of interactive information that computers were *supposed* to give everybody several years ago. Keep up the good work.

Michael Val Hietter
via America Online

Image Piracy

SHAME ON YOU FOR ALLOWING THE Epson advertisement to appear in the March 1993 issue [pp. 26–27, 29] that states, "Everything you see in your office you can see in your computer." I'm sure that all the photographers and illustrators whose publications appeared in the ad will be thrilled to learn that open season has been declared on scanning their work. Photographs and illustrations are protected by copyright at the moment of creation.

Gabe Palmer
West Redding, Connecticut

Macworld would be impossible without the contributions of many talented artists, photographers, and writers, all creative individuals whose work is protected by copyright law. We also depend on that law to protect our publication as a whole. Readers should not infer from the Epson advertisement that the ability to scan material into one's computer means that anything is free for the taking. As you point out, that's simply not the case.—Ed.

Call My Agent

MAGNET (WHICH IS NONETHELESS in my Startup Items folder) is even worse than you make out, morally speaking (*The Iconoclast*, May 1993). It's not just that it makes mistakes; it often outright refuses to obey explicit orders. For your own good, of course. In my case, it usually refuses to back up to a floppy more than once. If you're continuously updating your floppy backup, as Nisus does in paranoid mode, Magnet will refuse to overwrite the older file on the floppy, even when that's precisely what you've ordered it to do.

No Hands says that Magnet is merely being cautious and tries to keep both backups. But unless there is room for both the old version and the new version, Magnet decides that you want the older backup instead of the newer.

Flash Sheridan
via CompuServe

According to No Hands Software, Magnet won't overwrite a file if it's been modified since the last backup.—Ed.

THANK YOU FOR RECOGNIZING the leadership of Magnet 1.0 in the

continues

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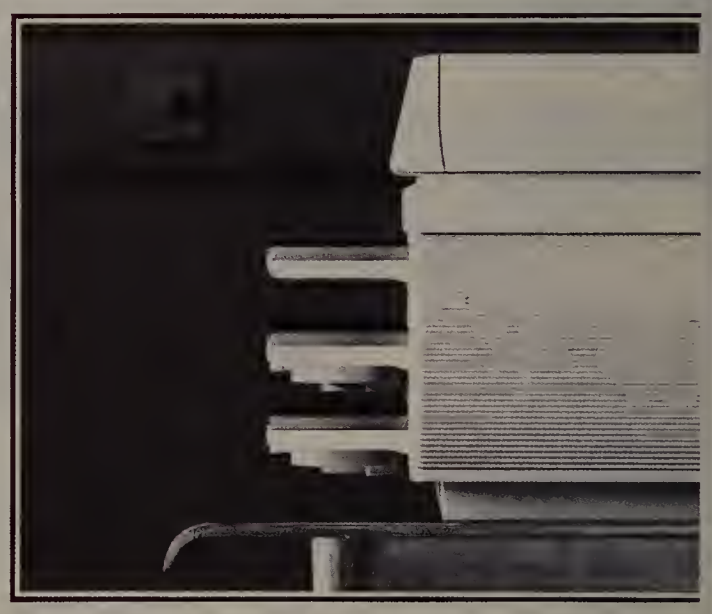
THIS SHOULD GIVE YOU
OF WHY WE CREATED A

The image you see over there started out attached to the image you see over here. But as this document made its way down to the printer, the Macintosh it was created on recognized a small problem: 11 x 17 pages can't fit through 8½ x 11 printers.

And so, out came the electronic scissors.

Now, if you're like many Macintosh users, you know all about this routine. And you know how it feels to walk into a meeting with a layout that contains hours of blood, sweat and tears, and a fat strip of tape right down the middle. Enough said.

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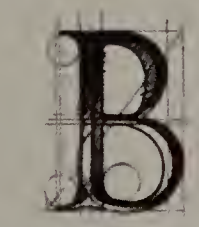
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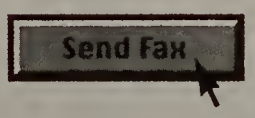
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emerging agent category in Steven Levy's May 1993 *Iconoclast* column. Unfortunately he implies that agent technology and Magnet 1.0 are unreliable. To set the record straight, Magnet didn't throw away files because they began with an uppercase letter. Magnet is not case sensitive.

It is particularly ironic that Mr. Levy attacked the product for moving files to the Trash. We have made it very difficult to create a magnet that automatically moves files to the trash—warning users several times when they try to do so. Mr. Levy, apparently, is the first customer who had files inadvertently moved to the Trash, but he did not lose any data. We will be adding another warning dialog to address Mr. Levy's situation.

As Franklin Tessler pointed out in his February 1993 review of Magnet, his "magnets always triggered reliably," and "anyone who routinely works with multiple disks will find Magnet invaluable."

Tony Stayner
President
No Hands Software

While Steven Levy's speculation about the cause of Magnet's unfortunate behavior—moving files to the Trash without warning—may have been incorrect, that behavior did happen. He created one agent, which he didn't like, to move many files. He tossed the agent into the Trash Can—which he did not empty—and then created another agent to move the same files. The files moved right on time, but into the Trash Can where the first agent existed. No warnings or dialogs alerted him to that move. As a result, users could unwittingly delete files they didn't know had been moved to the Trash.—Ed.

Sketch Defense

AFTER YEARS OF DEVOTION TO *Macworld*, I'm chagrined to be complaining the first time I write you a letter, but it needs to be done. In *Star Ratings* (May 1993), you rate Alias Sketch with three stars, citing its "quirky navigation" system. Sketch's interface is the only inspiration in the genre. It actually encourages wholesale editing of any element or of the whole design at any point in the process. It's the only modeler where pencil preliminaries may actually hinder the direct flow of ideas in three dimensions.

My other comment concerns your review of Kai's Power Tools (May 1993). Despite an undeserved shot at a *truly* quirky interface (which is a complete hoot to use), you say that KPT "puts previous filter collections like Aldus Gallery Effects to shame." Well, that's like comparing apples to jeeps. Truth is, the first thing I do with a new texture from KPT is haul it into Gallery Effects to rub off its raw edges and wear away some of that Martian quality. If you put a gun to my head, I'd part with KPT, but you'd have to pull the trigger to get my Gallery Effects.

Michael Young
Boston, Massachusetts

Michael, tune in to the review of the new version of Alias Sketch in this issue, where we join the ranks of Right-Thinking People. In the meantime, try to stay clear of any gun-toting crazies hopped up on chamomile tea and looking to score some Photoshop filters. We just hate to lose readers that way.—Ed.

Upgradability Gap

WHEN I FINALLY GOT A COPY OF Microsoft PowerPoint 3.0, I found that it was not backward-compatible with version 2.01. This is a shock because most of the new releases from Microsoft have included the Save As feature with options

continues



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to a lower version (for example, Excel 4.0 and Word 5.0). Microsoft personnel said that this feature is not supported with PowerPoint 3.0 and that the company has no plans to do so. So, if you use version 3.0 and need to exchange slides with other users, make sure that they have the newest version. How does Microsoft expect everyone who wants to make the switch to make it all at once?

Gabe Sbarglia
via Internet

PowerBook War Story

HAVING BEEN THE GLAD OWNER OF a PowerBook 140 as of almost the first minute, I am glad to share some good experiences that may help ease the pain of some who are dropping their hopes in its reliability and long-term durability.

I am an airline captain. The PowerBook has been a part of my crew bag right from the start and suffers all the banging, checking, scanning, and radiation/temperature/humidity/weather changes that everything else does.

Once, on a Maldive island, tiny live bugs crawled happily about inside my screen (and probably got eaten by my hard drive). In Lagos, Nigeria, my foot got hung in the charger cable and pulled the PowerBook off the table. After that, several keys would not print when I punched them, so I slapped the machine. Hard. It has worked ever since.

Once, we entered a thick cloud over Sri Lanka in which someone had hidden a thunderstorm. I was spending time on the HF to Bombay, drinking a late-night fifth coffee and writing a report on my PowerBook when we saw little blue, very cute flames dancing over the front shields of our cockpit. The loudspeaker crackled in that way that announces lightning and strong—very strong—static electricity nearby. My PB had just announced that its battery was running low and that the screen would be dimmed when it gave a bright, dreamy flash and shut itself down. "Uh-oh," I thought, and brought the plane down in Colombo in a heavy, hot rain. We had busted a hydraulic line, and while the engineers were busy fixing it I crossed my fingers and decided to find out what had made my faithful PB shut itself down. "Dsooonng." There it was, spelling through all those silly utilities. I checked in the bulging Trash Can and found "Items rescued from recent crash." My entire file, complete with illustration, was back, and intact.

Contrary to all warnings my PB 140 flies well and never disturbs any aircraft instruments. It just seems to smile at aircraft scanners. It has countless times forgiven me the hefty shove out of my lap and way to the left, when the aircraft needed handling.

My PowerBook 140 (4/40) has been, so far, a good and faithful travel companion.

John Twinkeys
Anaheim Hills, California

Can anyone beat this? Send your outrageous (but true) Mac survival stories to *Letters, Macworld,* and we'll print the best ones.—Ed. m

Letters should be sent to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1), or via Internet (70370.702@compuserve.com). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*

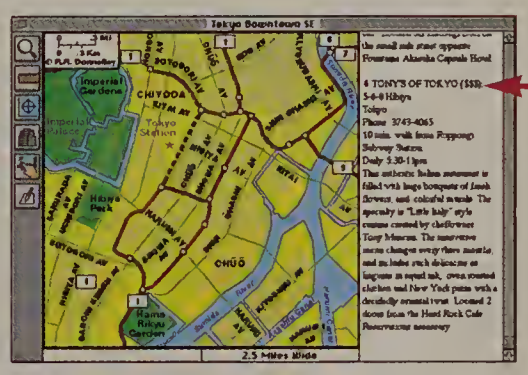


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This *nouvelle* Paris is built from 10 scanned images, color-corrected with Variations. ❶ Sky is selected and sized to proper resolution and dimension using Cropping tool, then pasted in. ❷ "Select Similar" automatically isolates Eiffel Tower girders from original background, permitting show-through. ❸ Mt. Rushmore is imported. ❹ Notre Dame and Monument Valley are paired, and Clone tool merges images seamlessly. ❺ New Pen tool selects road, Scale Command stretches it to fit. ❻ Water is placed into position using Rotate and Skew commands. ❼ Statue is selected with Quick Mask and cloned. ❽ Shadows are created by Quick Masking main images, skewing and rotating them into position; Gradient tool and Composite Controls let road appear through shadow. ❾ B/W cowpoke is colorized with Duotone feature; highlights and shadows are enhanced using Dodge and Burn tools. ❿ Transparency effect achieves some show-through on Caddie's tail lights.

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Art Beat

Behind Macworld's Graphics

BY CATHY ABES

Artist: Jeff Brice is a computer illustrator based in Seattle. One of his illustrations was awarded top honors in *Publish* magazine's Sixth Annual Design Contest (June 1993).

Hardware: Mac II with 32MB of RAM, Radius SCSI-2 Booster board, and Radius Rocket accelerator; AppleColor 13" RGB Monitor and Apple Macintosh 16" Color Display, with Radius PrecisionColor 24XP accelerated 24-bit graphics board; 520MB Fujitsu internal and external drives; Umax UC630 color scanner; AppleCD 300 external CD-ROM drive; Wacom 510C graphics tablet; 44MB SyQuest removable-cartridge drive; HP DeskWriter; Sharp JX-730 color ink-jet printer.

Software: ColorStudio 1.5.

How It Was Done: To illustrate our feature on Photo CD technology, Brice wanted to create an image that would blur the distinction between photography and digital media.

After placing two black squares in the center of a page in ColorStudio to block out the design, he gathered a selection of photos and graphics he was considering for use in the illustration and scanned them into ColorStudio, so they'd be easily accessible when he needed them.

Brice began with the photo of the seascape, which he physically composited from four separate photos. Then he adjusted the composite photo using the Color Correction command. To enhance depth and color, he added a blue gradation to the upper part of the sky, masking out the clouds with the lasso and the airbrush. After making these adjustments, he placed the seascape in the upper-left corner of the composition.

To create the centerpiece of the illustration, Brice scanned an actual CD. Once he had the scanned image open in ColorStudio, he used the Dynamic Effects command to squeeze it and give it a sense of perspective. In Shapes (a drawing supplement within ColorStudio that lets you create PostScript objects you can paste into ColorStudio files), he used the geometry tool to create an ellipse-shape mask that exactly fit the shape and size of the CD image. As a PostScript object, the mask could be manipulated until it was just right; later he would paste it into the mask layer of the main illustration, transforming the mask into a bitmapped image.



The illustration that opens the "Hands-On: Photo CD" feature.

Using the selection rectangle, Brice created a white mask of the seascape. In the same mask layer, he created a diagonal gradation from white (transparent) to black (opaque) underneath the seascape mask. Then he pasted the CD image with its mask into the illustration using the Mask Options command (⌘-6). This caused the top of the CD to fade gradually into the black background.

Next Brice created the preview images of the seascape. To make the boxes that hold the preview images, he again used the geometry tool in Shapes, but this time he created a rectangular shape. Using the grid tool, he created a grid in which to place the boxes, which he then pasted into the illustration. Later

continues

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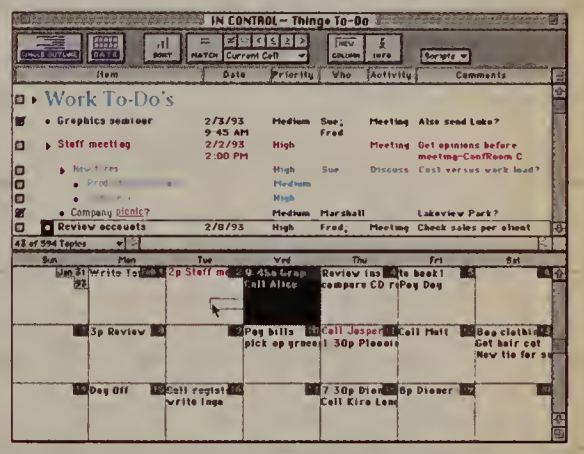
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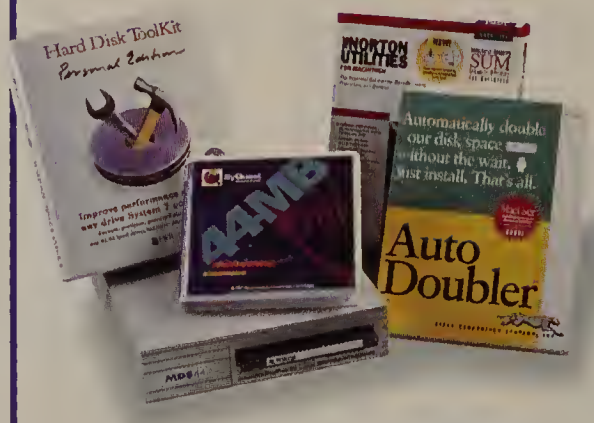
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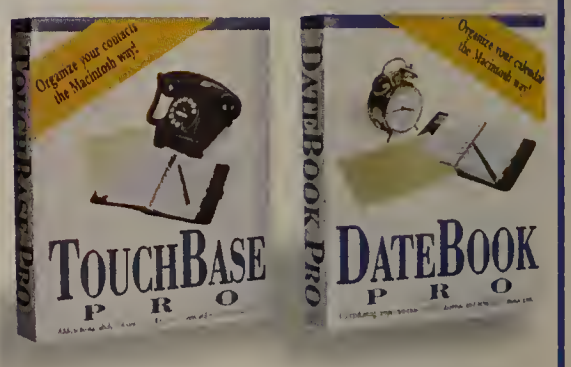
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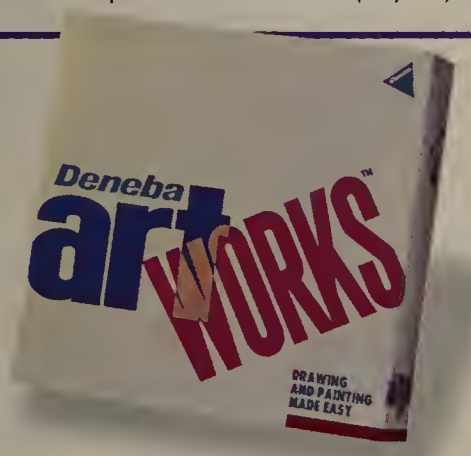
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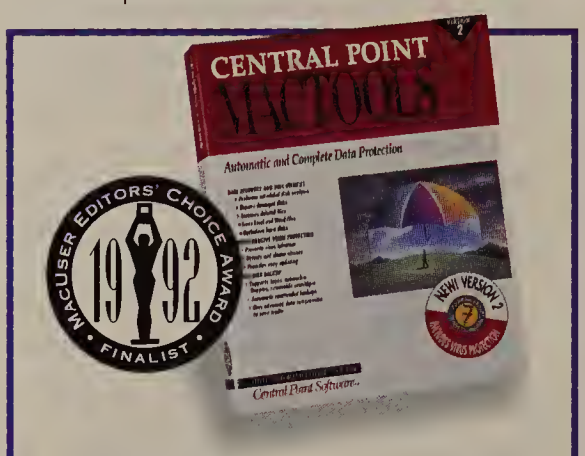


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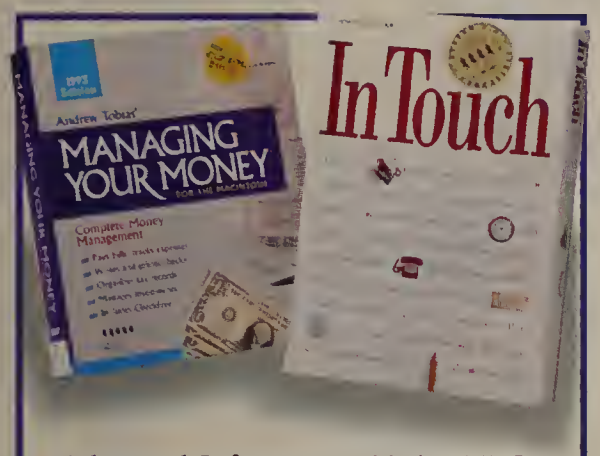
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11628 A-Train Bundle ..... 45.
★MECC ... 30 day MBG
3960 Number or 3959 Word Munchers... *ea.* 18.
3963 Oregon Trail 1.1 ..... 28.
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8695 Capitalist Pig ..... 34.
Psygnosis
11562 Lemmings..... 35.
★Que Software ... 30 day MBG
9743 Typing Tutor V..... 29.
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11098 Crosswords... 20. 7396 Red Baron .. 39.
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★Spectrum Holobyte ... 30 day MBG
3464 Tetris..... 22. 3017 Wordtris 1.0.. 28.
4835 Super Tetris 28. 9113 Falcon Color. 39.
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7624 NEMESIS Go Master 35. 7623 Deluxe 99.
Velocity
11538 Spectre Supreme 40. 11537 LAN 2-Pak 52.

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Articulate Systems
7007 Voice Record 56. 2034 Voice Impact 79.
Voice Navigator SW (Head/Desk Mike) *ea.* 319.
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7651 Action! Mac..... 349.
4598 MacRecorder Sound System PRO..... 239.
5087 MacroMind Director ..... 799.
2246 Macromedia 3-D..... 999.
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11738 Pro Audio Spectrum 16 for Mac ..... 329.
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4252 MultiSync 3FGx..... 689.
Nova Development
11101 Kaboom!..... 27.
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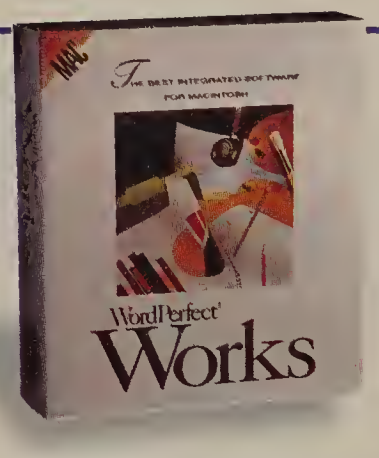
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11541 ErgoView 17 ..... 1349.
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5201 The Miracle *(piano teacher)* ..... 349.
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10530 14" Multiscan Trinitron Monitor..... 689.
10529 17" Multiscan Trinitron Monitor..... 1149.
Sound Source
Star Trek: Original TV Vol. 1 or 2 ... *ea.* 30.
11483 Star Trek: Next Generation Virtual Data 30.
11484 Star Wars 30. 1759 A Space Odyssey 35.
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7676 VideoSpigot Pro or 3691 Pro si... *ea.* 1075.
9074 Spectrum/24 PDQ+ ..... 1599.
7679 Spigot & Sound.. 519. 7678 Pro... 1165.
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4720 21" Platinum Two-Display ..... 1139.
9067 ColorLink LC 499. 9070 ColorLink DC/T 539.
10321 ColorPage T16II ..... 1389.
9066 Futura SX ..... 499.
9065 Futura MX..... 875.



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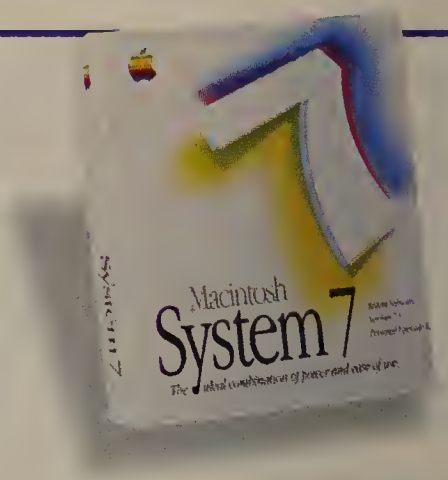
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5737 *After Dark 2.0x (30 plus screens!)*..... **28.**
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11003 Family Doctor HyperCard Version..... 45.
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7313 SOUND Series Vol. 1 ..... 105.
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10923 Multi-Session Photo CD-ROM Drive ... 699.
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Warner New Media
11008 Desert Storm 27. 11007 Word Tales 39.
11028 Magic Flute 44. 11026 The Orchestra 54.
Wayzata Technology
Font Pro Vol. 1 & 2..... *ea.* 59.
11605 CD Fun House 25. 10188 Macnificent 7 35.

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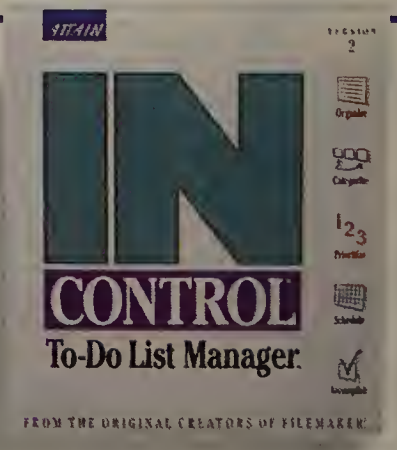
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7073 Mac PC Exchg. 59. 7102 AppleShare 969.
7101 AppleTalk Remote Access ..... 149.
★ **Applied Engineering ... 30 day MBG**
11707 QuadraLink... 199. 10361 DMA..... 399.
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BOCA Research
11052 M144I V.32bis FaxModem ..... 239.
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2300 Smartcom II Mac 84. 3226 Upgrade 44.
5971 OPTIMA 24 119. 5970 OPTIMA 96 359.



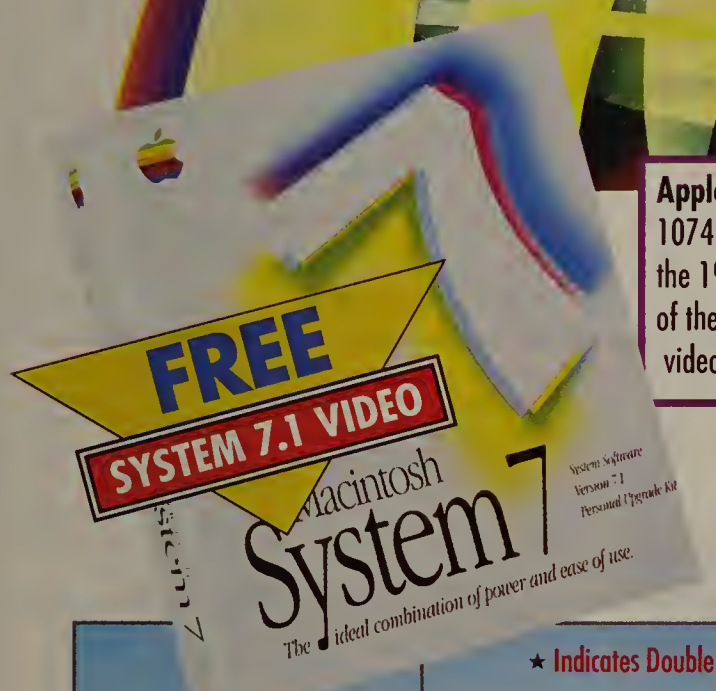
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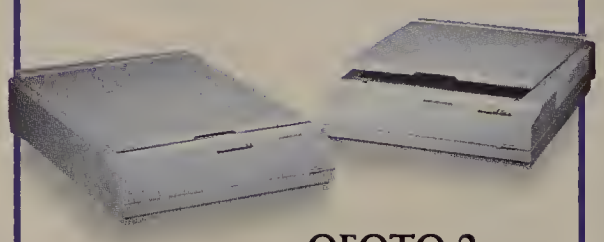
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7557 Access PC.. 59. 3441 SoftNode 2.0.. 99.
4089 Univ. SoftPC. 99. 10553 SoftPC Win .. 299.
11631 SoftPC Pro 3.0/RapidTrak Bundle..... 195.
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7572 LaserBridge 135. 7573 SuperBridge 169.



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7789 Mac 1B Interface *(w/Central Pt. Backup)* 39.
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3678 120 MB Port. HD 375. 3663 210 MB 539.
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11470 PLI Infinity 88/RW 44 ..... 699.
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PowerLink DeskNET *(Thin,10/T) (July) ea.* 639.
10322 PowerLink Presentor ..... 459.

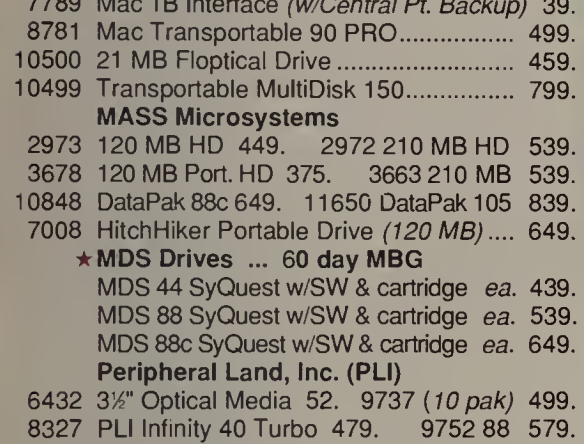
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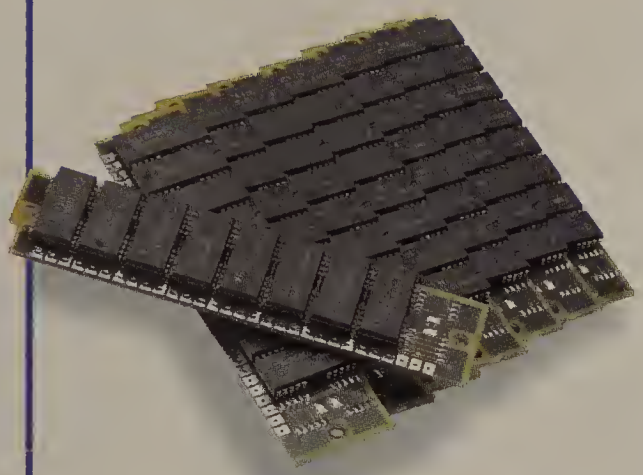
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7379 3½" HD Disks *(11)*... 13. 2241 *(50)* ..... 59.
4863 3½" HD Disks *(20)* with storage case.... 25.

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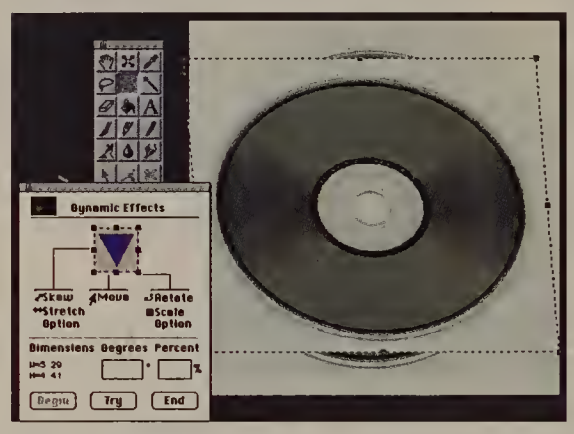
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The original scan of the seascape photos, from which the artist created one composite image (left). In the mask layer, Brice used the lasso and the airbrush to mask out the clouds in the seascape before adding a blue gradation to the sky.

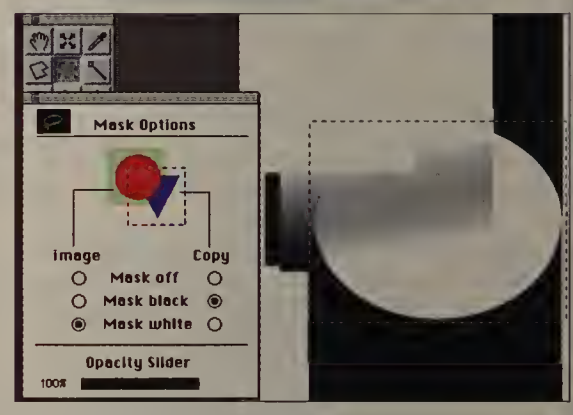


The seascape image after the artist adjusted the colors with ColorStudio's Color Correction command and added blue to the upper part of the sky.



The scanned image of the CD after Brice used the Stretch Option of the Dynamic Effects command to compress its shape, thereby adding some dimension.





The ellipse-shaped PostScript object Brice drew in Shapes (ColorStudio's drawing supplement) to mask the CD image (top). After creating a white mask of the seascape and a white-to-black diagonal gradation underneath the seascape mask, Brice used the Mask Options command to paste the CD and its mask into the illustration so that the top of the CD would fade into the black background.

he copied pieces of the illustration and pasted them into the boxes.

To symbolize the Kodak digitizing process, Brice pixelated the space between the CD and the preview images by choosing the Pixelate filter (under the Effects menu). Then he began adding the other graphic elements, starting with the video screen—a black-and-white graphic element he made into a mask using the Copy Value To Mask Layer command. This brought only the black lines defining the screen into the paint and mask layers, enabling him to see those lines both in the illustration and in the mask layer. The red box that surrounds the video screen was created in Shapes and pasted at 30 percent opacity in the paint layer only. With the selection rectangle, he drew a mask over the red box, then held down the ⌘ key and clicked inside the box to make it a floating box. After giving the box a white fill, he used Mask Options to make the video screen's lines white, then pasted the screen into the illustration. Using the lasso tool, he made the inside of the screen a floating box and created a dark-gray-to-light-gray gradation and pasted it into the mask to preserve all the screen lines. After pasting a portion of the seascape into the screen, he used the selection rectangle to select a small part of the red box, then inverted that section's color to cyan, which produced the illusion of a translucent layer over part of the illustration.

Brice scanned the film strip, and photos of the camera ASA dial and zoom numbers. The last element to be added was the screen shot at the bottom, from Shoebox, Kodak's image-cataloging program, to which he added the seascape image.

The illustration took approximately 15 hours to create, and the final file size was 30MB. m



With the seacape and the CD in place, Brice used the geometry tool in Shapes to draw the boxes into which he then copied and pasted preview images of the landscape (left). Once he'd pixelated the area where the preview boxes and the CD overlap, Brice used Copy Value To Mask to bring only the video screen's black lines into the illustration's paint and mask layers; after creating and masking the red box, he used Mask Options to make the screen lines white, then pasted a gray gradation into the screen mask.



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Wiretapping the Fast Lane

BY STEVEN LEVY

ALAN McDONALD IS A G-man all the way. Brisk gray suit, neatly cropped hair, and a craggy, implacable physiognomy that would give him a leg up in a poker game. He seems comfortable yet businesslike as he addresses the cyberati—the weird mix of hackers, cops, civil-rights lobbyists, journalists, librarians, and net-tenders in attendance at the third annual Computers, Freedom, and Privacy Conference held this spring. McDonald's colleagues in law enforcement aside, it's a tough crowd. His job, as the special assistant to the assistant director of technical services, is to explain, from the FBI's perspective, proposed legislation that would essentially outlaw all future communications technology—unless it was designed to accommodate wiretaps.

That's right, if Congress accepts the FBI's recommendation, every piece of electronic equipment that communicates—from your modem up to and including the phone system itself—will have to include a feature that will allow easy access by the FBI, or local police, or any other authority who convinces a judge to approve a wiretap. Those whose products do not provide this trapdoor are subject to $10,000-a-day fines. The massive cost of making an entire industry surveillance-friendly will be borne not by the law-enforcement agencies but by the consumer.

A slew of organizations have spoken against the legislation, commonly called Digital Telephony. Last September the Electronic Frontier Foundation, in concert with a coalition of 35 organizations, issued an analysis of the proposal. Its conclusion: Digital Telephony stinks. To quote: "The proposal would impose substantial costs and create significant uncertainties, despite the absence of any clear showing that the proposed measures would be either effective or necessary." Concurrence comes, oddly, from the government itself; a General Accounting Office evaluation of the Digital Telephony proposal concluded that the FBI has not justified a need for the measure.

The bill has been kicking around for over a year now—I mentioned it in my August 1992 column—and I had somehow figured, what with all these criticisms and with the high-tech Clinton-Gore team in power, that the Digital Telephony initiative had faded away. But Digital Telephony supporters are still knocking on Congress's door. They are also winning a few surprising converts, notably Georgetown University professor Dorothy Denning, a computer security specialist who had been known for giving hackers a fair shake. In a recent issue of the *Communications of the ACM*, which is a sort of *New Republic* for dataheads, Denning wrote a lengthy brief in favor of Digital Telephony and became an instant subject of vilification over the nets. Unbowed, she sat on the dais as Alan McDonald vigorously argued in favor of Digital Telephony. The legislation is still alive, and attention must be paid. But first, let's hear what its supporters say.

Myths and Contexts

"I WANT TO GIVE YOU THE *CONTEXT* OF what this is all about," says McDonald in his speech at the conference. Though there are considerably fewer than 1000 authorized wiretaps a year, these are regarded as crucial tools for law enforcement, he explains. For many years, setting up these wiretaps presented no technological challenge. The FBI agents, or whoever wanted a phone monitored, simply worked with the phone company and tapped into the line. But according to McDonald, that began to change in the 1980s. Communications were going digital. An abundance of new communications services and techniques emerged—everything from cellular phones to computer networks to call-forwarding services to the phone company's ISDN services. Many consider these empowering advances. But to electronic eavesdroppers, the march of technology is not merely annoying, but a genuine threat to the Republic.

McDonald claims: "These new technologies are eroding the ability to wiretap." In the good old days, a handy alligator clip could intercept a coherent analog conversation; today's digital communications present police with a furious tangle of 1s and 0s. Conversations fly through the air, bounce off satellites, or mingle in fiber-optic cables with a seething ragout of digits representing other conversations, electronic mail, fax, and file transfers. Even things as mundane as call forwarding or speed dialing make things tougher for those authorized by courts to surreptitiously listen in on the conversation of a suspected perpetrator. McDonald implies there were criminal cases when wiretaps were not sought because law enforcers knew that the task would be technologically challenging. Things, he says, are difficult and getting worse.

The solution, McDonald asserts, is the Digital Telephony bill, which if passed would require that all electronic communications systems and equipment be specifically designed to accommodate electronic surveillance "at a federal monitoring facility," in real time. This would not, he insists, give the government more power to intrude on its citizens. It simply would restore a capability that law enforcement once had, but now seems to be losing due to technology's nettlesome habit of improving itself regardless of the implications for legitimate law enforcement. The FBI needs Digital Telephony just to keep running in place.

"We don't believe that this is a privacy matter," McDonald asserts at the conference. "It is important not to law enforcement but the general public. Electronic surveillance not only provides evidence for a crime, but *prevents* crime." He cites, without getting into specifics, two cases of successful prophylactic wiretaps. One where "we stopped a plan to shoot down an airliner," and another involving pornographers swapping preproduction notes about a snuff film in which the victim would be a child. "This is someone's child—not an abstraction," he says. The implication is that if Congress does not pass this legislation, we will be left defenseless against terrorists and our children will be raped and murdered on videotape.

continues



Here's crime-fighting tip number one: dumb down technology

Tears for Fears

CLEARLY, THE PROPONENTS OF DIGITAL Telephony are playing on our fears. Yes, they say, implementing this law might cost some money, and it might require engineers to design things in a different, maybe even less optimal manner. But it is a small trade-off considering the consequences of not wiretapping—crime and terrorism. They also insist that Digital Telephony is not an extension of government intrusiveness but merely something to assure continued use of a very effective, court-approved means of obtaining convictions.

I don't buy this at all. The Digital Telephony bill would give law-enforcement officials access to rich new streams of personal information. While wiretapping once meant only intercepting phone conversations, Digital Telephony expands the range. We now communicate by E-mail, computer conferences, and newsgroups; send faxes; and access databases. In the near future, all manner of financial transactions will be conducted over ultraportable personal digital assistants. Many of our communications will occur over the National Research and Education Network, NREN, the gigabyte-capacity "information highway" that is the object of Vice President Al Gore's fervent ardor.

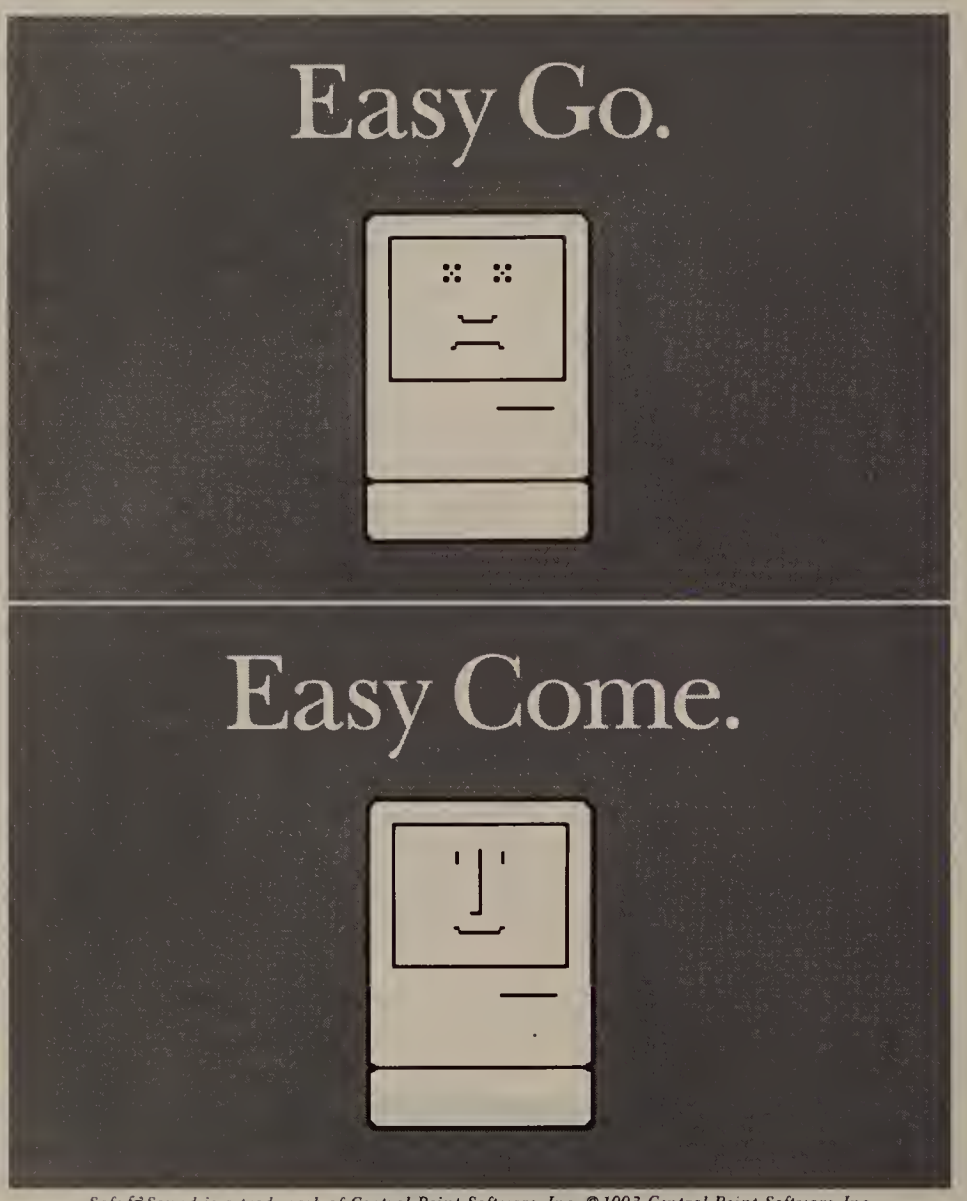
Under the Digital Telephony bill, *all* of these systems and machines would have to be designed so that somehow, at the instant a message is sent to or received by a subject of a wiretap investigation, a law-enforcement agent could receive that same string of bits. (Yes, even the vaunted data highway will be pocked with speed bumps.) No one even knows if this is possible, let alone feasible. But if the bill is made law, and the surveillance capabilities are built into our new technologies, rest assured that officers will request wiretaps with the works—access to everything. Maybe this is acceptable in legal, court-ordered surveillance. But where are the guarantees that this power will not be abused by officials overstepping their bounds—as abuses have undeniably occurred previously? Also, can we be absolutely sure that these trapdoors into communications technology won't also provide a means of access for a swarm of unauthorized intruders?

For me, though, the most ominous aspect of this proposal is its absolutely ass-backward approach to law enforcement. Wiretaps may indeed be a valuable and moral law-enforcement tool, but they originated because of the serendipitous appearance of the telephone. In that case, technology was regarded like geography: its terrain was accepted as the playing field and law enforcement negotiated around its obstacles. Why can't this arrangement continue, leaving it up to the FBI to find ways to adapt to the new telecommunications reality? In fact, the FBI budget includes $80 million over five years for that very purpose. Despite this, we are being asked to "dumb down" (as an ACLU spokesperson put it) our entire communications structure for a single, unrelated purpose—fighting crime. Simply because law enforcement finds wiretapping useful for its purposes, it feels justified in drafting an entire industry, against its will, to aid it in obtaining convictions.

Breaking the Codes

ELSEWHERE IN THIS ISSUE, CHARLES Piller describes the current state of privacy in the computer age. In many ways it is dismal. However, the computer, the same tool that has enabled government and big business to accumulate and maintain databases with your personal information, as

continues



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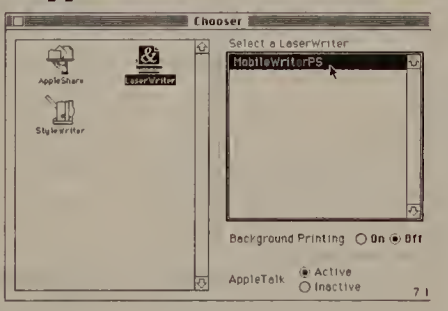




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well as monitor you in the workplace, is truly a double-edged sword. In a switchcroo worthy of Pac-Man after eating the magic dot, this machine is capable of returning our privacy to us. This can be achieved by encryption software, tools for encoding digital communication so that only the sender and the intended recipient can read it. Through cryptography we can protect our communications and safeguard our data in the digital era. In addition, creative, privacy-oriented cryptographers are discussing ways that encryption tools can be used to prevent the accumulated linking of personal data that provides outsiders with a detailed, even intimate portrait of an individual.

The current draft of the Digital Telephony legislation does not directly deal with cryptography. But I think it inevitable that if it passes, a second shoe would soon drop—the banning, or severe weakening, of cryptography. What would be the point in allowing surveillance of digital communications if the subjects of the investigations encrypted all their messages? I don't think I'm giving anything away to Colombian drug rings and child pornographers by informing them that one can obtain, for free, programs like PGP or RIPEM, which provide cryptography strong enough to keep government code-cracking supercomputers tied up for weeks or months—effectively, keeping cops and feds out of your hair. I can hear the arguments now: If preserving the sanctity of wiretaps is important enough to mandate a surveillance-oriented redesign of our computers, networks, and communications systems, certainly it is important enough to take the final step and limit cryptography.

If Digital Telephony becomes law, and citizens are denied access to strong cryptography, the relentless web of data we weave around ourselves will be transparent to any law-enforcement agency with a warrant. And if some branch of government, or some corrupt official, decides to gather these digital bouquets without court authorization . . . well then, it would be a breeze for them to do so. Finally, we will be vulnerable to intrusion or attack from any number of vicious outsiders—creative saboteurs, industrial spies, malicious hackers, crooked investigators, and authors of computer viruses.

It's pretty weird that in a country where citizens pack 200 million guns, the technology the FBI wants to control is the communications system. But why stop there? We can really make it tough on criminals if everyone has mandatory identification cards, random property searches become the norm, and lie-detector tests are routine. If we truly support the philosophy of the Digital Telephony legislation, we should ban doors that are thick enough to withstand being kicked in by FBI agents. But does that really go far enough? Perhaps we should outlaw conversation in parks and on sidewalks too, since such exchanges occur beyond the reach of normal surveillance.

Americans have resisted such temptations to date, because our entire philosophy of government is based on protecting individuals from unreasonable state intrusion. This time, too, we can cave in to unfounded fears and allow the Digital Telephony initiative to happen—or we can resist the siren song of the FBI. I appeal to Mr. McDonald and the rest of his colleagues at the FBI: cease and desist. You should appeal, as well—to your representatives in Congress. Let's drag the Digital Telephony bill to the Trash Can.

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).

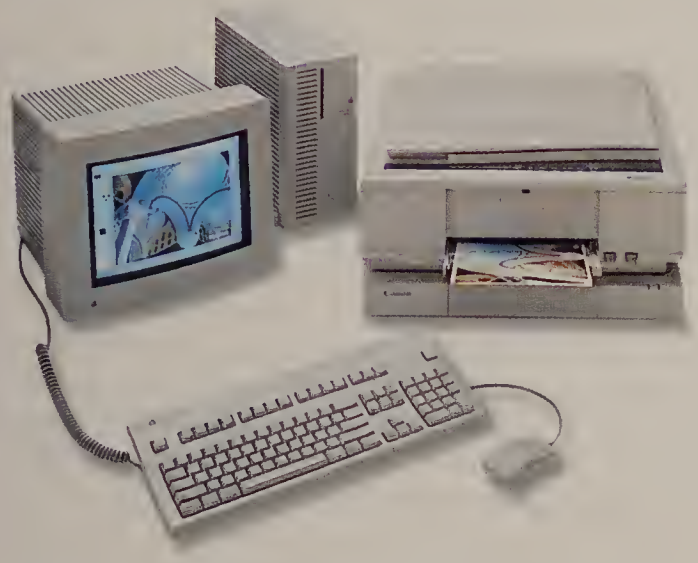


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GET READY FOR COLOR!

Color emerges as the new corporate standard

BY ERIC J. ADAMS



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EVERY FEW YEARS the corporate world ups the ante. It redefines what it considers "acceptable" output for written communications.

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It's called desktop color, and it's poised to revolutionize the way we communicate on paper, transparencies, and slides.

Until recently, you needed a separate color copier, printer, and scanner to include color in your documents. But few workgroups could afford all these devices, and fewer still had the expertise to use them correctly.

Now there's a solution for those who want great color at an affordable price with little or no learning curve. It's the truly revolutionary CJ10 from Canon — the only complete, one-stop color solution designed and priced for the non-graphics professional, yet sophisticated enough for the graphics world as well.

MEET THE CJ10

The compact CJ10 lets you easily add color to your reports, proposals, handouts, transparencies, signs, maps, diagrams, schematics, illustrations, menus, layouts — you name it.

For starters, the CJ10 is a high-quality *digital* 400-dpi copier that utilizes state-of-the-art Bubble-Jet technology. The CJ10 gives you 16.7 million colors that leap off the page (check out the reviews). It pumps out a full-page color copy in about 90 seconds for about one-third the price you'd pay at a color copy shop. As a stand-alone copier, we think the CJ10 is the best low-volume color copier you can buy.

But the CJ10 is far more than a copier. When used with an optional Intelligent Processing Unit (IPU) and your computer, the CJ10 becomes a color scanner and printer as well.

Now you can scan in photos and illustrations for computer enhancement and manipulation. As a color printer, the CJ10 is virtually maintenance-free, and provides better colors than any comparable color printer we've seen.

Scan, print, manipulate, copy, all on the same desktop device — color has never been so easy. Plus you can make color copies from slides and film negatives, make transparencies, and even capture video using the CJ10 and optional equipment.

At a suggested list price of $6,995 ($9,695 with optional SCSI-interface IPU), the CJ10 is the first affordable, high-quality color solution for the office.

Please take a look at the benefits of the CJ10 and see how spectacular — and easy — color can be.

WHY COLOR?

Want to add punch to your message? Color helps you:

- Attract Attention
- Add Impact
- Highlight Critical Facts
- Clarify Complex Information
- Increase Retention and Recall
- Evoke an Emotional Response

COLOR YOUR WORLD

Putting color and the Canon CJ10 to work for you

Whatever you business, color can help you get your message across with drama and style.

IF YOU THINK you can benefit from desktop color, you're not alone. Already thousands of companies, workgroups, and individuals have put the multifunction CJ10 to work for them.

Law firms, for instance, are using the CJ10 to create and distribute evidentiary information in criminal and civil cases. And since the CJ10 is user friendly, attorneys and their assistants don't need special training to create color documents immediately.

Architectural and engineering firms are making heavy use of the CJ10 for job proposals and bid specifications. Since the CJ10 can scan as well as copy and print, these proposals include color photos, renderings, and sketches designed off-line, as well as illustrations created on a computer with a CAD or drawing program.

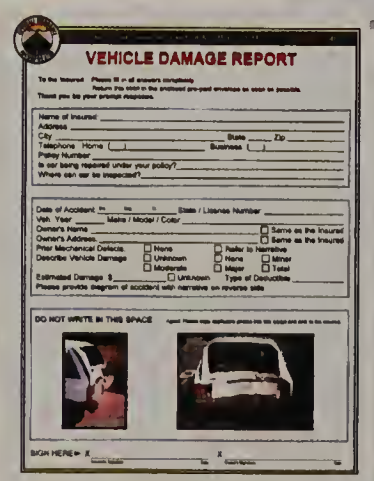
Banks and financial institutions are using the CJ10 to create highly-stylized financial reports and presentations for senior management, board members, and share holders. Presenters don't have to worry about using dated information, since charts, illustrations, and graphics can be updated and reprinted using the CJ10 and an Intelligent Processing Unit.



Architectural



Manufacturing



Insurance



Real Estate

Contractors and developers have discovered that the CJ10 is a great way to put together winning bids, preliminary estimates, prequalification papers, and project management schedules. Color makes the complex look simple, and gives bids an award-winning look. Developers also like the CJ10's ability to quickly reproduce photos for pre-development packets and post-presentation handouts.

Education departments, schools, and universities are putting the CJ10 to work in the classroom with color transparencies and hand-outs for class lectures. And the CJ10 is at work throughout campuses providing distinctive signs and posters for bulletin boards and student and faculty centers.

Insurance companies are speeding up the claims process by including CJ10-generated color photos and collision diagrams in adjuster reports. Meanwhile, sales agents are using the CJ10 to incorporate color flowcharts and diagrams in their presentation materials used to win over customers.

GRAPHIC PROOF

Graphic artists and designers have discovered the CJ10 as an inexpensive and easy way to output highly accurate color composites as a proofing device on four-color marketing and promotional materials.

Manufacturers are finding the CJ10 an accurate and reliable manufacturing tool. Many are using the CJ10 to create and duplicate technical documentation, workbooks, assembly instructions, and manuals for internal staff members and off-site contractors. The high-resolution (400-dpi) output of the CJ10 ensures that important details are reproduced crisply and clearly.

Real estate brokers and agencies have increased sales by adding color photos and floor plans to property fliers, property fact sheets, and pitch books. High-impact color documents help attract potential buyers and convey a strong message of success and commitment to potential sellers. Best of all, the cost of reproducing color in-house is often far less than contracting the job to an outside printer.

Training firms are among the most enthusiastic about the CJ10. It allows trainers to develop, print, and duplicate training schedules, certificates, workbooks, instructor guides, transparencies, study reports, and course catalogs.

WHAT'S YOUR LINE?

Whatever you do, chances are there's a way to make it more exciting, expressive, persuasive, and compelling with color. To find out more about the versatile multifunction CJ10, contact your local Canon authorized CJ10 dealer or call **1-800-OK-CANON.**

The Canon CJ10 gives you...

SHOW-STOPPING COLOR

Easy, affordable, superb color from a multifunction copier, printer, scanner

WHEN DESIGNERS SET OUT to create the CJ10 they had two guiding principles: It should be easy to use, and it should deliver vibrant professional-quality color unlike anything else available at the price.

We at Canon believe the CJ10 has succeeded on both counts.

EASY AS PIE

The CJ10 is as easy to set up and use as a conventional copier or printer, and just as compact. The only replacement items are four Bubble-Jet cartridges, which contain all the important replacement components and are designed to be individually replaceable to keep the cost of consumables low.

All controls for the CJ10 are located on a front control panel that provides fingertip access to a full range of color functions, such as 50% to 200% Zoom in 1% increments, independent X/Y Axis Zoom, Photo and Color Balance, and multiple copies of 1 to 19.

The 90-sheet paper tray slides out for easy paper loading, and the CJ10 comes with a manual feed system for optional transparencies, label paper, or card stock. Warm-up time is only 10 seconds, so you don't have to keep the CJ10 running between jobs.

The CJ10 platen cover is double-hinged so you can copy directly from thick or bound materials, such as books and technical documentation. And the CJ10 is compact, just nine inches high, 21 inches long, and 19 inches deep.

The CJ10 automatically adjusts color balance for you, but if you want or need special control, you can easily lighten or darken each color and set contrast yourself, again with controls accessible from the front panel.

As a scanner, the CJ10 lets you choose scan resolutions from 72 to 400-dpi, and color depth from 8-bit gray scale to 24-bit color. Printing is as easy, too. The CJ10 allows for automatic or manual color control from your computer's Color Control dialog box, and you can select up to 999 copies when printing.

All the optional equipment is designed with the same ease-of-use in mind.



The Canon CJ10 is designed to be virtually maintenance free, with Bubble-Jet cartridges that contain all the important components.



With precise 400-dpi resolution and 16.7 million brilliant colors, the Canon CJ10 creates bold and realistic output.

VIBRANT COLOR

Whether copying, printing, or scanning, you'll find the color from the CJ10 simply outstanding. With 16.7 million *smudgeless* colors at 400-dpi, the CJ10 offers 33% greater resolution and twice the number of colors as comparable devices. In fact, the CJ10 meets many of the specifications for Canon's high-end Color Laser Copiers.

The secret of the CJ10 is the Bubble-Jet technology and design. Each Bubble-Jet cartridge (cyan, magenta, yellow, and black) contains 128 self-cleaning print nozzles.

The precise print heads and ink nozzles fire approximately 4,000 times *per second*, and are automatically cleaned each time you turn on the CJ10. These "intelligent" cartridges are designed to self-adjust when a nozzle temporarily clogs or misfires.

The CJ10 produces one full-color copy in approximately 90 seconds. To produce the best possible image, Canon supplies a family of coated papers, such as 8.5-inch-by-11-inch card stock, transparency film, label sheets and 5.5-inch-by-8.5-inch statement paper.

The CJ10 automatically detects text and overprints with black ink, giving you the best of both worlds — rich, vibrant colors and crisp, clean text.

For more information, or to test drive the versatile CJ10, contact your local Canon authorized CJ10 dealer or call **1-800-OK-CANON** today.

EXPAND YOUR COLOR HORIZONS

With optional equipment, you can turn your Canon CJ10 into a professional color workstation. Clockwise from left to right: Canon CJ10 with an Intelligent Processing Unit, CJ10 Film Projector, CJ10 Intelligent Editor, and Video Adapter 10.

YOU CAN TRANSFORM your CJ10 into a full-fledged multimedia workstation with available optional equipment. Here are the major equipment options available for the CJ10. Look for more options from Canon in the near future.



■ **Intelligent Processing Unit (IPU) & IPU Kits** To use the CJ10 as a scanner and printer, or to share the CJ10 on an AppleTalk® network, you'll need an optional Intelligent Processing Unit (IPU) and an IPU Kit for Macintosh®.

There are two IPUs available. The IPU SS connects via a SCSI port and includes 2MB of memory for buffering data.

The IPU DG connects to a General Purpose Interface Board (GPIB) and includes 16MB of memory.

The IPU and IPU Kit include all you need to scan and print in full high-quality color, and comes with a Chooser-level QuickDraw™ Printer Driver with advanced color adjustment controls, a print spooling application, and a network printing driver for remote access of the CJ10.

The kit comes with Adobe PhotoShop™ Plug-In modules for scanning and printing from within your Macintosh applications, such as QuarkXPress 3.1®, Time Arts Oasis®, ColorStudio 1.5®, and PixelPaint Professional 2.00™.

The kit also includes a SCSI Interface Card, SCSI Cable, and software for easy installation and testing.

■ **CJ10 Intelligent Editor** This remarkable device literally turns the CJ10 into an image-editing station. Its revolutionary pen-based interface lets you manipulate and enhance images in any number of ways before printing.

You can, for example, select a precise image area to be selected or deleted, reduced or enlarged. You can use the Intelligent Editor to change colors, or add or reduce color gradations.

The Intelligent Editor lets you combine two or more separate images onto the same page or divide a large original for printing in sections on 8.5-by-11-inch paper.

■ **CJ10 Film Projector** The film projector is designed for presenters who need a quick and easy way to produce hard copy from 35mm slides or negatives, or those who want to reduce turnaround time and costs associated with producing hard copy.

Optional equipment transforms the Canon CJ10 into a multimedia maestro

You can use the Film Projector in conjunction with the CJ10 Intelligent Editor to further manipulate or enhance images. The Film Projector's auto exposure and auto color adjustment ensures high-quality reproductions.

■ **Video Adapter 10** The Video Adapter lets you capture NTSC video images from a number of sources including VCRs, television monitors, video cameras, and still video products. By hooking the adapter to the CJ10 via the Intelligent Processing Unit, you can capture images to your computer's memory for later image retrieval and manipulation.

Discover the world of desktop color

WHEN IT COMES TO improving your presentations and written communications, nothing comes close to the power of color. The CJ10 is an easy-to-use desktop solution designed to deliver high-quality color at an affordable price.



A copier, printer, and scanner, the Canon CJ10 is the clear choice for all your color needs.

With the CJ10 and optional Intelligent Processing Unit you can copy, scan, and print color documents and transparencies, making it possible for the first time to bring the power of color to everything you do.

To learn more about the power of color and the multifunction CJ10, call your local Canon authorized CJ10 dealer or **1-800-OK-CANON**.

Canon CJ10 COLOR BUBBLE-JET COPIER

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Troubleshooting without Tears

BY DEBORAH BRANSCUM

WHEN MY MAC HUMS along smoothly, letting me finish my column, crank out letters, or do research online, I'm in technoheaven. But when the machine suddenly crashes, hangs, or slows to a crawl—almost always as a deadline looms—I could kill it. Alas, I have a classic love-hate relationship with my computer.

That relationship is fueled, in part, by unexplained system crashes. Some Mac problems are pretty clear. Too little RAM stretched over too many applications will quickly bring up a disappointing dialog box. Under System 6, memory woes and crashes can be caused by insufficient heap space, not just too little RAM. But how should users tackle subtler problems?

Tech-support expert Ralph Wilson, in *Help: The Art of Computer Technical Support* (Peachpit Press, 1991), recommends an organized approach, as follows.

Think about what you're doing. If possible, slowly and deliberately retrace the steps that triggered the problem.

Check the documentation. "Readme files often provide the solutions to the most annoying problems because the problems hadn't been encountered yet when the manual was written," writes Wilson.

Check the usual suspects. Go over the fundamentals. Make sure cables are connected, the machine is plugged in, and you've followed installation and configuration instructions.

Use a simple system. Compatibility problems are common. Make your system as vanilla as possible. "This might mean booting the computer from a floppy, or removing special devices from the configuration." Adding elements back, one program or device at a time, can aid in locating the source of the trouble. (The extent to which you'll want to dismantle your system depends on the type of problem. System crashes are rarely caused by hardware, for example.)

Can you repeat it? Which actions lead to the problem? What conditions trigger it? Keep track of details. Even though some conditions are intermittent, "you might be able to discover patterns to the system behavior that point to the cause."

The Five-Step Solution

EVEN IF YOU FOLLOW WILSON'S ADvice, it can be difficult to track down and troubleshoot a particular problem. Error messages rarely help; and the Mac can be a complicated beast, with only 80 zillion or so possible hardware-software configurations, combinations, and applications. But don't despair—help is on the way. Fact is, most Mac problems are system software or application related. And most repeated crashes, hangs, and start-up problems should disappear if you follow this simple, five-step procedure.

1. System 7 users should restart while holding down the shift key to disable all the extensions. You should be greeted by "Welcome to the Macintosh. Extensions off." (System 6 users have to move their INITs and cdevs out of the System Folder manually.) Extensions and cdevs are notorious as the most common source of system weirdness because they change or enhance the system software. They may conflict with the System itself, another extension, or a combination of extensions and cdevs. So turning them all off should tell you quickly if that's the source of your problem.

If extensions are the source of your problem, try removing half of them at a time from the System Folder (put them in a folder labeled Test) to narrow down the conflict. Add them back a pair at a time until you have located the offending extension. Or try using one of the diagnostic programs listed below. (Extension Manager, a free program, is available from user groups and online services to help you manage the little beasts. Many commercial utility programs do that and more.)

2. Rebuild the Desktop file by restarting as you hold down the option and ⌘ keys. Click on OK when asked if you want to rebuild the desktop. The invisible Desktop file keeps track of icon definitions and file types and includes an application list that actually keeps some information about any program ever installed on your hard drive. A corrupted Desktop may cause an illogical "Application Not Found" message. Rebuilding the Desktop file is useful even if you're not getting that message, because it reduces the Desktop file size; applications should start up more quickly as a result. (There is one small trade-off—any comments entered in the Get Info dialogs of your apps will be lost in the process.)

3. Completely reinstall your system software. Clean, new system software often solves Print Monitor problems, font conflicts, and other random problems, according to *Macworld* contributing editor David Pogue. The problem is that the Installer updates the System rather than completely replacing it unless you move the Finder out of your System Folder. Then rename your System Folder (Old System works nicely) and reinstall the System. (Anything you need from the old System is still available, of course, and can be moved over.)

4. Zap your PRAM! Resetting your machine's parameter RAM, which stores user settings such as time and date, may fix random glitches that nothing else will solve. "Since I've had my PowerBook, I've had to zap my PRAM three times because my hard drive went offline," says Steve Costa, executive director of the user group BMUG. Under System 7, you can reset the PRAM by restarting and holding down ⌘-option-P-R until the Mac restarts again. System 6 users must restart from a floppy, then hold down shift-option-⌘ while opening the Control Panel. A dialog box will ask for confirmation. (BMUG recommends resetting it two or three times, because it may not work the first time.)

5. Update your hard drive software for System 7—if the first four steps haven't solved the problem, and you use System 7. The handiest—and least expensive—way to do it is with Apple's Disk Tools disk, which comes with your Mac. Third-party drivers include Drive7 from Casa Blanca Works, and Silverlining from La Cie.



Five simple steps solve many problems

More Helpful Hints

WHEN YOUR SYSTEM FREEZes or crashes, try pressing ⌘-option-esc. This emergency

continues

quit command sometimes lets you quit out of open applications, although you can kiss good-bye any unsaved work on the current file. Steven Schwartz, author of *Help! The Mac Answer Book*, recommends saving all open documents under new names, in case the files have been damaged, then shutting down your Mac for a few minutes before starting it again.

The emergency quit may not work—you may have to use the programmer's switch to restart. Just turning off the computer is a bad idea because an unexpected interruption of power can damage any open applications, according to Tom Nichols, a system software whiz at Apple Computer. Persistent problems with an application may mean that it is corrupted. If that's the case, trash the program and reinstall it from a healthy backup copy.

If you do have a crash, immediately use hard drive diagnosis software to check for hard drive directory damage. Apple's Disk First Aid comes free with your Mac, or you can use a popular utility program such as Central Point Software's MacTools or Symantec's Norton Utilities for Macintosh—both rated four stars in a *Macworld* review. And both have useful emergency disks that include system software and all its extensions on one floppy.

An Ounce of Prevention

TO AVOID TROUBLE, ALWAYS TURN OFF all your INITs before you install new software. Anything that can affect your Mac's performance (such as a read-write conflict) might affect a successful install, according to Macintosh system software consultant Gene Steinberg. Likewise, disable (temporarily) virus software on your Macintosh, since it may interrupt the installation process.

Having printing problems? Don't quit from a program until Apple's Print Monitor utility is no longer visible in the application menu. This simple approach may solve your troubles, according to Pogue.

Preventive maintenance should include regularly checking your hard drive with a utility package, Steinberg says. If your system crashes often, it's not a bad idea to optimize hard drive performance with one as well (backing up first, of course). And register all your programs, so you can keep up-to-date on virus-detection software and application upgrades with bug-fixes.

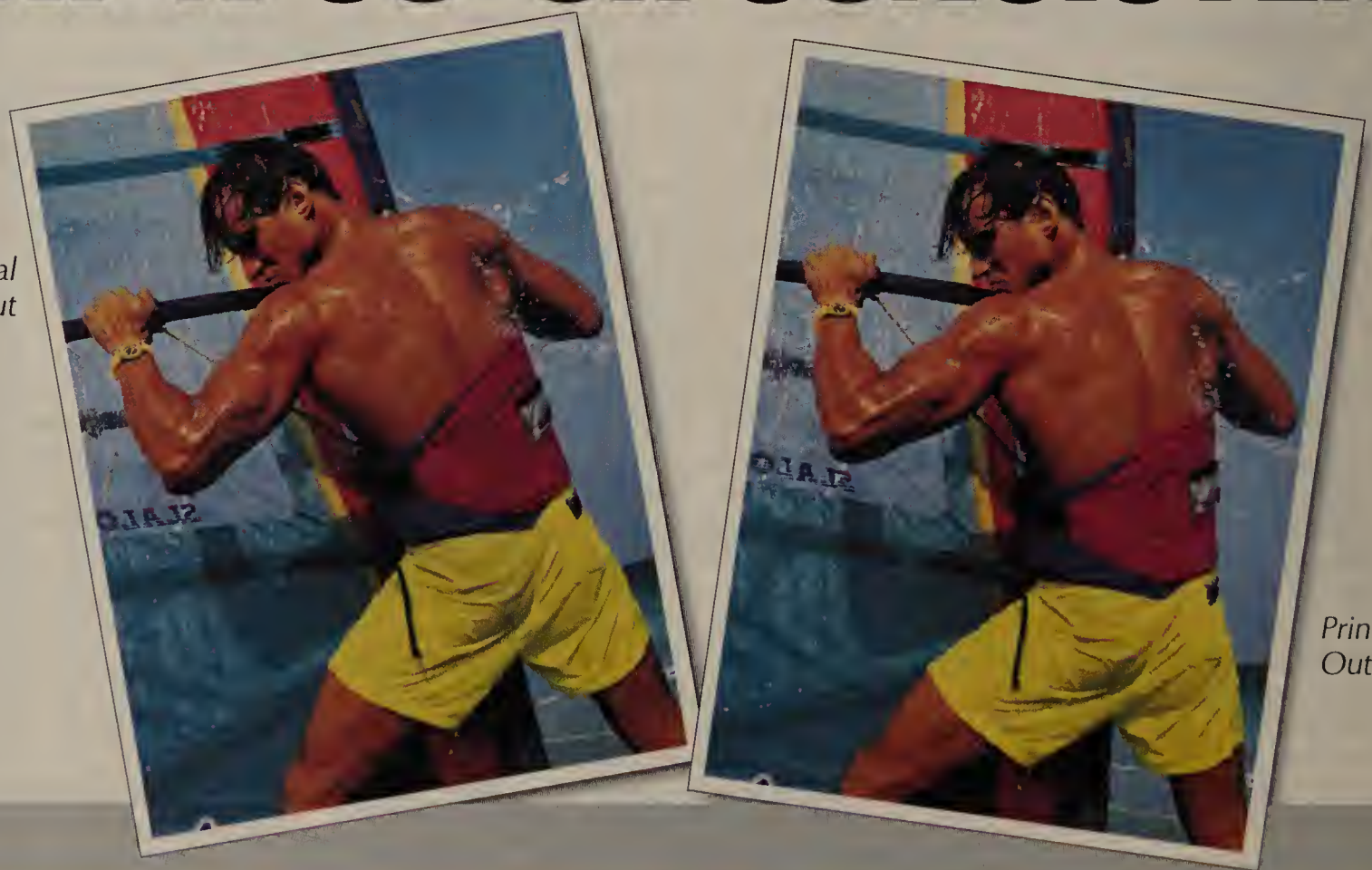
Tools of the Trade

A FEW SOFTWARE PROGRAMS ARE DESIGNED specifically to diagnose Mac problems and let you know about software upgrades. Help, from Teknosys (813/620-3494), and Alert, from Maxa Corporation (818/543-1300), track software incompatibilities and system problems. Their databases contain information on bug-fixes and other situations that software publishers may not want to share publicly but that might affect your Mac.

The programs are not identical. Help, which has been out since 1991, lets you save and print diagnostic reports based on your Mac's configuration and programs. The $149 program draws on a database of 6300 items; it reports on conflicts or problems it finds and explains how to solve them. Quarterly updates to the database (and upgrades to the program during the year) cost $75 for an annual subscription. A BBS for more frequent database updates is in the works for May, along with a network version of Help; list prices start at $525 for a 25-pack.

A database is also central to Alert, which shipped in late April. The $249 program, which can be used on a network, does not let you save or print reports (although it will in the future). It does let you allocate more memory to applications; manage system extensions to avoid conflicts; and turn off 32-bit addressing from within Alert. (Teknosys says Help will get

WHEN COLOR CONSISTENCY



Original Input

Printer Output

similar features this summer.) A module for diagnosing Mac problems via modem should be shipping shortly. Maxa says its database will be updated monthly; users can download the updates at no charge from online services, or pay shipping only for quarterly updates on disk.

Several programs for locating hardware problems also exist, including Maxa's Snooper (in software only, or in a software-and-NuBus-board combo) and Polybus Systems' (603/883-6442) Peace of Mind program.

Troubleshooting Tomes

MANY BOOKS PURPORT TO AID AND abet Macintosh users; here are several I found useful in researching this column.

For hardware troubleshooting, *Dead Mac Scrolls* (Peachpit Press, 1992) is a terrific book. Author Larry Pina has done the difficult work of figuring out the most common problems, outlining the symptoms, offering a probable diagnosis, and suggesting a solution—often involving a soldering iron. This $32 volume comes with a 30-day money-back guarantee.

Help! The Mac Answer Book (Alpha Books, 1992), by Steven Schwartz, is a straightforward volume that addresses common questions in a problem-solution format for $14.95. It has tons o' tips—I like the book a lot.

Macworld Macintosh Secrets (IDG Books Worldwide, 1993) by *Macworld* contributing editor David Pogue and Joseph Schorr is due out in August for $39.95. The book includes two disks of software and a useful chapter on troubleshooting that helped form the basis for the fabulous five-step solution above.

Troubleshooting Your Macintosh (M&T Books, 1992), by Douglass High, also has a five-step fix for dealing with operating system problems, although High's fix is different from mine. His suggestions: check the Mac for viruses; check the system software version; check application version; reinstall application software; and reinstall the System. I think my fix makes more sense, partly because viruses are overrated as a cause of problems. But this $29.95 book has some solid advice, including ideas for solving network problems.

Forward Ho

COMPUTING ISN'T EXACTLY THE FINAL frontier, but it's still easy to get halted by confusing error messages and system crashes. The tips and tools I've outlined above should help move you forward. **m**

Service Heroes

Jean-Pierre Harrison of Mountain View, California, writes in praise of Mobius, which repaired his single-page display three weeks after the warranty expired. "My screen was repaired, upgraded, and returned promptly at no charge," Harrison writes.

A more distant reader, Dr. Giulio Trillo of Basel, Switzerland, was happy with Address Book Plus until he upgraded to System 7.1—and landed in the world of system crashes. He faxed PowerUp Software for help. "The same day a tech-support representative called me at home, and spent about 20 minutes with me until he identified my problem," writes Dr. Trillo, who was impressed both with the phone call to Europe and with the technician's offer to send him a new copy of the program.

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

HANGS IN THE BALANCE.

Introducing the KODAK COLORSENSE Color Manager. For true color balance across your entire Macintosh Computer System, in one complete and affordable solution.

To get the colors you want out of your color desktop peripherals, you want the KODAK COLORSENSE Color Manager.

It's a software tool that balances your color desktop peripherals so they all speak the same color language. It's also a hardware tool that calibrates your monitor for consistent screen display over time.

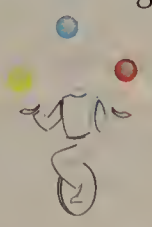
The result? Balanced, accurate color from start to finish. What you see is what you get. No more guesswork. No more surprises. So now, when you want to present or sell a graphic idea, you'll have the color you want. Instead of a poor excuse. You'll also generate fewer reprints as you work. Saving you time, material, and wear and tear on the printer.

Thanks to an easy-to-use interface, the COLORSENSE Color Manager is a cinch to set up and use. Just select the devices (scanners, Photo CD disc, monitors, printers) and the COLORSENSE Color Manager does the rest.



Call 1 800 242-2424, Ext 56 (in Canada: 1 800 465-6325) today for information on the KODAK COLORSENSE Color Manager. And experience accurate color like never before.

Kodak COLORSENSE COLOR MANAGER



Even visionaries need to see reality

Kodak

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- Lowest cost per megabyte for disk storage
- Comes with FWB Hard Disk Tool Kit
- "Fast, inexpensive, good technical support, a rare combination of qualities in a storage device." MacWorld



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44 MB Removable 19ms access time, 2 Yr Warr, Includes cartridge $388
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105 MB Removable 19ms, 2 Yr Warr, Includes cartridge, ... $748

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	W/Softbackup	W/Retrospect	W/Retrospect Remote
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CD-ROM Bundle For Kids *save $90* **Includes:**
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CD-ROM Fun Bundle *save $240* **Includes:**
Animals · San Diego Zoo, Lucas Game Pack, Guiness Book, Sherlock Holmes $99
CD-ROM DTP and Fonts Bundle *save $555* **Includes:**
Font Fun House, Font Pro Vol. 1, Publish It! & Fonts, Color It! $79

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520mb 3.5" Internal $748
1.2 Gig 5.25 Internal $1288
2.4 Gig 5.25 Internal $2448



Conner Drives

		Internal	External
C 42 MB	3.5" LPS, 2 yr warr,150,000 MTBF	$168	$218
C 85 MB	3.5" LPS, 2 yr warr,150,000 MTBF	$198	$258
C 120 MB	3.5" LPS, 2 yr warr, 150,000 MTBF	$238	$298
C 170 MB	3.5" LPS, 2 yr warr, 150,000 MTBF	$258	$318
C 212 MB	3.5" LPS, 9ms, 2 yr warr, 150,000 MTBF, Fast SCSI	$328	$388
C 540 MB	3.5" 8.5 ms, 2 yr Warr,150,000 MTBF, Fast SCSI	$858	$918

These new Conner drives are so reliable, that Conner has been one of Apples largest suppliers of drives. The 150,000 hours Mean Time Between Failure and the incredible speed of the 540 are just two reasons to buy a Conner.

Fujitsu Drives

		Internal	External
105 MB	3.5" LPS 9ms, Fast SCSI, 3yr warr, 200,000 MTBF	$198	$248
520 MB	3.5" 9ms, Fast SCSI, Syr warr, 200,000 MTBF	$748	$848
1.1 Gig	3.5" 8.5ms, 5yr warr, 300,000 MTBF, Fast SCSI	$1198	$1298
1.2 Gig	5.25" 11.5ms, Syr warr, (MacWorlds Fastest Gig!) Fast SCSI	$1248	$1348
2.06 Gig	5.25" 11.5ms, Syr warr, 300,000 MTBF, Fast SCSI	$2288	$2388
2.4 Gig	5.25" 11.5ms, 5yr warr, 300,000 MTBF, Fast SCSI	$2448	$2548

*Mean Time Between Failure is the average life expectancy of a drive.

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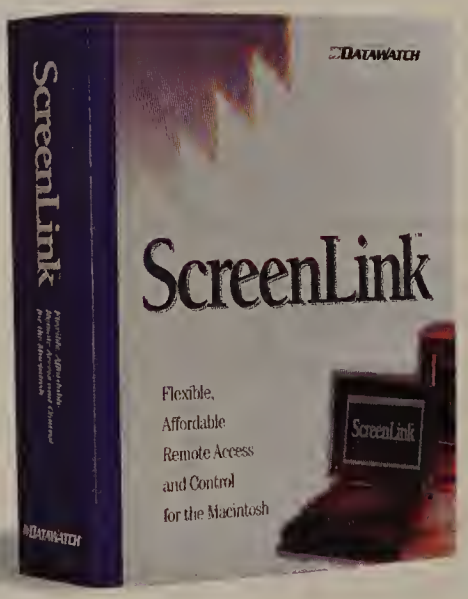
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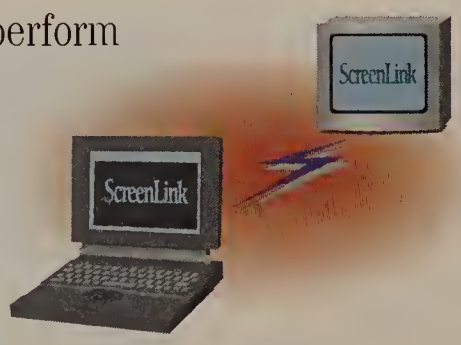
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Lab Notes

Finding the Right Router

BY MATTHEW CLARK

AT FIRST GLANCE, ROUTERS SEEM TO be simple devices with one lot in life—to move data along a network from point A to point B. But a closer look reveals that these powerful devices are far more complex than one might expect.

For this month's comparative review of LocalTalk-to-Ethernet routers, "Rating Routers," Macworld Lab set up a small workgroup environment consisting of four client/server pairs to find out how quickly each router could send packets of data from an Ethernet client to a LocalTalk server. After generating a 1MB text file from each Mac IIci client and sending it to the server (also a Mac IIci), we measured and recorded the transaction time. At low traffic levels (one client/server pair) the routers performed similarly, passing along data at approximately 1MB per minute. At higher levels of network activity, differences became apparent. Some routers continued directing network traffic at a consistent speed while others slowed down (see the table "LocalTalk-to-Ethernet Routers" in "Rating Routers").



HANK OSUNA

But it's not always easy to figure out why a particular router is sluggish, because performance is affected by a number of variables, including CPU speed, router software, and additional router features such as device hiding, soft seeding, and TCP/IP tunneling.

Processor Speed

AT THE HEART OF EVERY ROUTER IS A processor that is similar to a Mac's processor (software routers use the Mac's processor). This processor handles most of the traffic processing: examining a packet, looking up the packet's address in the routing table, converting the packet to its appropriate format (for example, Ethernet or LocalTalk). The processor's duties can also include transferring data from a LocalTalk port to an Ethernet port.

Many of the routers we tested include additional circuitry or built-in coprocessors that reduce processing time from the CPU, most often by handling I/O functions. The Farallon InterRoute/5 uses ASIC (Application Specific Integrated Circuit) chips—special chips designed to optimize specific procedures—for carrying out some of these functions.

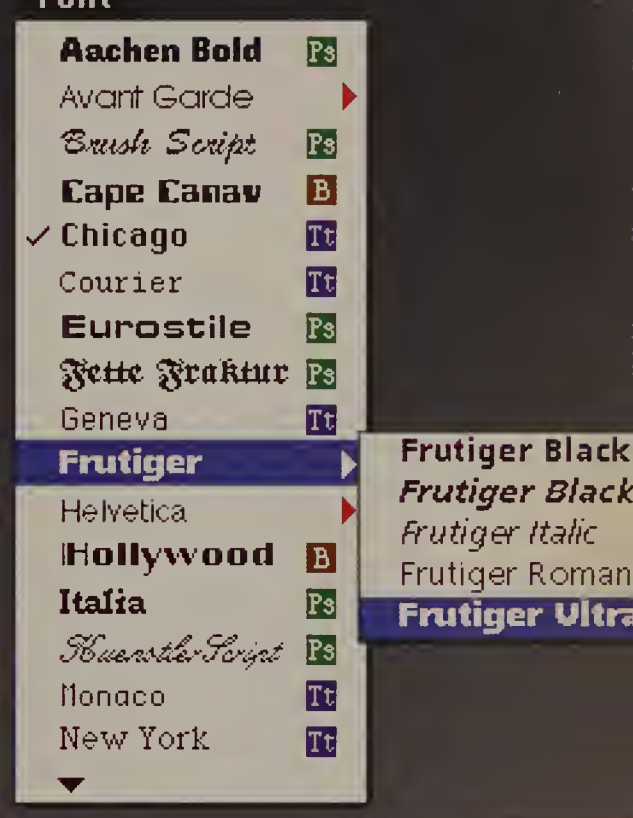
The FastPath 5 from Shiva contains two processors: a 10MHz 68000 (the main engine) and a 10MHz Z181. The Z181 handles all LLAP (LocalTalk Link Access Protocol) transactions, which enable two nodes on a network to communicate via LocalTalk. The sending node transmits a packet to the receiving node requesting permission to begin a transmission; the receiving device then sends back a packet granting permission. Without the Z181, the monitoring required for these transactions would take up valuable cycle time on the 68000 processor.

Router Software

A POWERFUL PROCESSOR IS ONLY AS good as the software (and firmware) that runs it. The main challenge for router software developers is coming up with fast algorithms for packet filtering, address resolution, and routing-table lookups. These algorithms are applied to speed up the processor and related circuitry (such as coprocessors and ASIC chips). Another technique for boosting speed is Direct Memory Access (DMA). The CPU directs a DMA controller to send packets of

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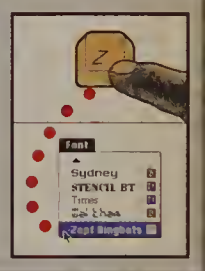
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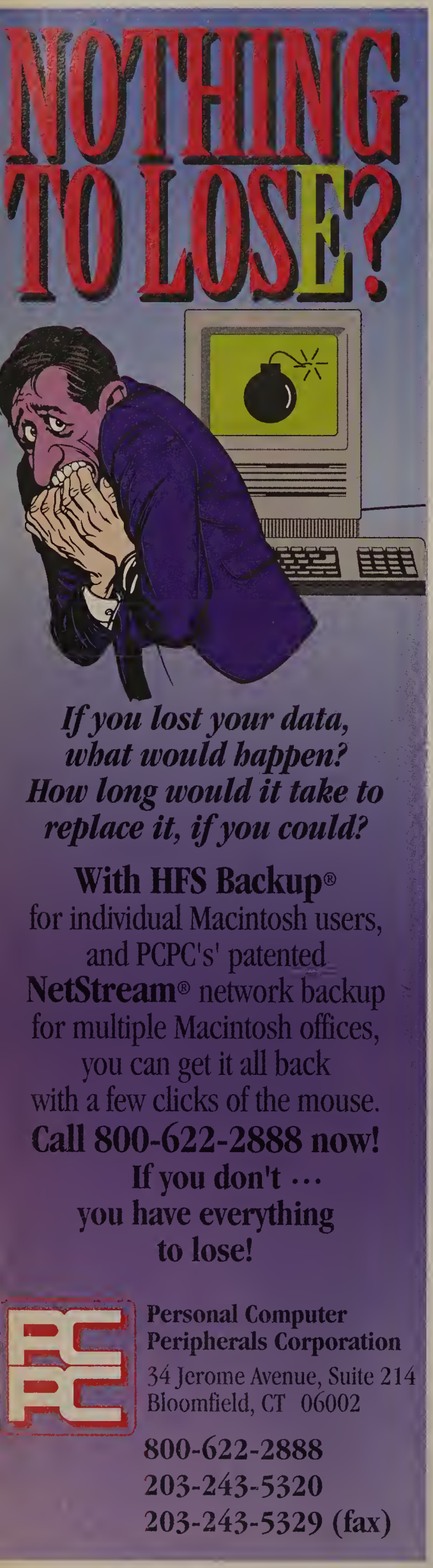
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Router Buffers

ANOTHER FACTOR THAT AFFECTS router performance is buffer management. Proper buffer management ensures sufficient buffer space for all packet traffic, and consequently prevents the buffers from dropping packets, which would then have to be retransmitted. (Packets can be dropped when the volume of traffic is too great for the router's processor to handle.) Good buffer management provides enough lead time for the processor to handle increased volume by creating a bigger queue for holding data.

Additional Features

USING A ROUTER FOR MORE THAN simple LocalTalk-to-EtherTalk affects router performance. Features such as DECnet support and TCP/IP tunneling (which allows two or more AppleTalk networks to communicate via TCP/IP networks by encapsulating AppleTalk packets within TCP/IP packets) add overhead because a router must perform more checks on a packet before forwarding it to its destination.

Device hiding (a filtering method for restricting users' access to certain devices on a network) is another feature that adds overhead to the routing process, because it requires the processor to search for specific packet types that may need to be filtered, or hidden, from certain zones. In addition, general packet-filtering—for example, restricting users in one zone from seeing devices in another—affects performance. The router must perform additional checks to validate the packet against the criteria in order to determine if the packet can be forwarded.

Configuration-related features, such as designating network names and numbers and soft seeding, do not affect performance because they are established at start-up as part of the network-configuration process. (At start-up, a seed router provides network numbers and zone information to other—nonseed—routers on the network. With soft seeding, or autodiscovery, a nonseed router first tries to find a seed router from which to obtain network-configuration data; failing that, it seeks the data from network traffic; as a last resort, it uses default—or manually entered—information.)

Speed versus Stability

EVEN MORE IMPORTANT THAN SPEED, as we discovered during our testing of routers, is a router's consistency. Routers must pass along data at a consistent rate so that a user can be assured of a consistent transfer time. When network service degrades we usually suspect a flaw in the network—such as a faulty Ethernet board—when the problem may actually be caused by a router performing inconsistently at different traffic levels. The network managers we spoke to during our testing generally consider reliability more important than speed. Cayman Systems, for example, enjoys a reputation among network managers and system integrators for providing stable routing.

Router Evolution

SO WHAT ADVANCES IN ROUTER TECHnology can we expect to see next? Prices have already decreased dramatically in the last couple of years. We've seen similar price cuts for Ethernet boards. In addition, the growing popularity of 10BaseT has fueled the Ethernet boom by increasing the ease with which networks can be configured and reconfigured. Though LocalTalk will remain the staple for smaller (under ten nodes) networks, midrange to large installations have little or no reason not to migrate to Ethernet. Router vendors are aware of this potential market and are poised for action.

By the time you read this, Cayman and Compatible Systems should both be shipping Ethernet-to-Ethernet routers, a new type of product that breaks up existing Ethernet zones into smaller zones that limit traffic to fewer nodes.

The growing availability of higher-bandwidth media such as FDDI (Fiber Distributed Data Interface) translates into even faster networking. FDDI supports transmission rates of 100 megabits (100 million bits) per second; standard Ethernet handles one-tenth that, or 10 megabits per second. Although FDDI is not yet cost-effective for individual nodes, it's being used for backbone implementation. While currently only high-end routers are able to use such connections, we can probably soon expect to see FDDI and CDDI (Copper Distributed Data Interface) cabling topologies supported by lower-end routers like those we just tested.

Another major trend is the combination of a router and a hub—like Farallon's Star Router and Cayman's GatorStar GX. This allows for the seamless integration of two highly critical network services.

Whether you're building a network from scratch or expanding an existing one, take the time to choose the device that most closely meets your needs. Speed is important, of course, but don't forget about stability and expandability. The router you select today should be able to expand with your network during the next five years. Spending wisely now will save you time and money in the long run. **m**

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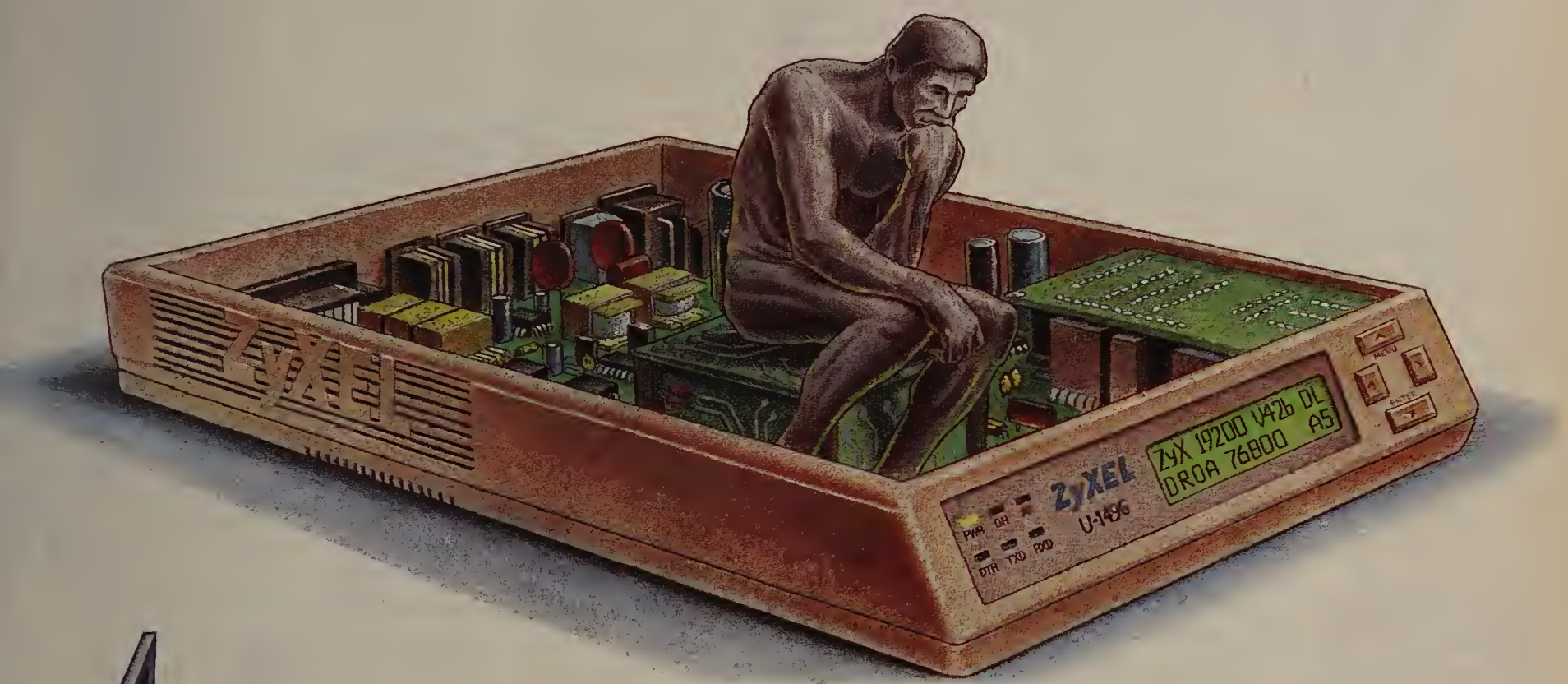
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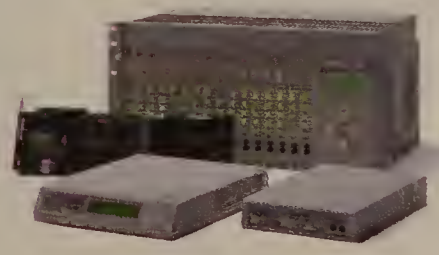


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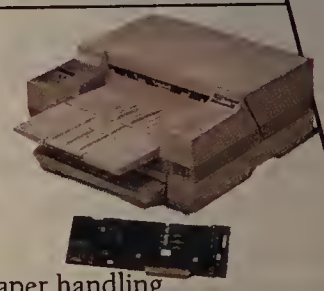
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BY DAN LITTMAN AND TOM MORAN

HP's Fast Color Ink-Jet Printer

DESIGNED FOR quickly printing business documents containing spot color, the HP DeskJet 1200C/PS from Hewlett-Packard is a PostScript ink-jet printer that puts out up to 7 pages per minute. Not intended for CAD/CAM or other high-end color printing, the DeskJet 1200C/PS prints type at resolutions up to 600 by 300 dpi and color graphics at up to 300 by 300 dpi, both on plain paper.



PAUL BERG

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The printer offers three printing modes: normal mode produces 6 ppm of 300-by-300-dpi text or 1 page every 2 minutes of color graphics; high-quality mode produces 4 ppm of 600-by-300-dpi text or 1 page every 2 minutes of 300-by-300-dpi color graphics; and fast mode produces up to 7 ppm of 300-by-300-dpi text or more than 1 ppm of one-pass color for proofs or low-density images. The high-quality mode can also create one transparency about every 3.5 minutes.

The DeskJet 1200C/PS comes with PostScript Level 2 and HP PCL 5 printer-control languages. The printer can sense whether a file is PostScript or PCL 5 (from DOS machines) and switch between the languages. The 1200C/PS also comes with a LocalTalk connector and a Centronics parallel port switches between the interfaces automatically. The printer ships with 35 IntelliFont, 10 TrueType, and 35 Adobe typefaces, plus ATM. The standard model comes with 4MB of RAM, expandable to 20MB. HP expected to begin shipping the printer in late May, at a list price of $2399. HP, 800/752-0900.—T.M.



RICHARD RETHEMEYER

HP'S UPCOMING KITTYHAWK II IS A 2-INCH HARD DRIVE THAT STORES 42MB AND WEIGHS ABOUT AN OUNCE.

World's Smallest Hard Drives

Lewis Carroll's Alice could nibble mushrooms, munch cookies, and quaff potions to adjust her size, but miniaturizing hard drives requires more than Wonderland magic. Nevertheless, with the portable/notebook market growing rapidly, the potential rewards are attracting vendors to the field. Hewlett-Packard, following up on the Kittyhawk Personal Storage Module, has announced the Kittyhawk II, a 42MB drive that measures 2 inches by 1.44 inches by 0.4 inches, weighs about an ounce, and would fit comfortably in the palm of your hand.

HP claims that the drive requires only half the power of a 1.8-inch hard drive and weighs about a third less. The company is looking to the traditional miniature computer markets (notebook, subnotebook, PDA, pen-based) but is also confident that the Kittyhawk II will trigger a wave of portable electronic products.

Meanwhile, SyQuestTechnology has announced that it is developing a line of 1.8-inch removable-cartridge hard drives, specifically targeting the PCMCIA standards. Yes, you read it right—removable cartridges just under 2 inches square. Expect to see shipping mechanisms by the end of 1993. Hewlett-Packard, 800/826-4111; SyQuest Technology, 510/226-4000.
—CAMERON CROTTY

Apple Shows PowerPC Software

AT THE ANNOUNCEMENT in March of the PowerOpen Association, Apple demonstrated an early version of Macintosh Application Services (MAS), Apple's strategically crucial software designed to support current Mac applications and the Finder on PowerPC RISC-based

continues

"I DON'T NEED (tick) YOUR DATA (tick) PROTECTION SOFTWARE (tick). I'VE HAD MY MAC (tick) FOR YEARS AND (tick) IT HASN'T CRASHED (tick) YET."

Not to alarm you or anything. But if a lot of wishful thinking is all that's standing between you and a Mac meltdown, you may want to check out a more proven method of protection.

We suggest the Norton Utilities for Macintosh v2.0. It both prevents data loss and gives you the most effective data recovery features available. In other words, it's like giving your computer its own personal bomb squad.



Without us, one crash can ruin your whole day.

For starters, let's talk prevention. The Norton Disk Doctor hunts down potential problems and lets you squash them before they become actual nightmares. Plus, Speed Disk defragments files and boosts performance of your hard disk, making data loss less likely in the first place. So far, so good.

Now, the recovery part. Our FileSaver feature keeps a record of vital disk information, which helps you rescue files if you happen to lose or delete them. On top of that, you get automatic backup. It's total security like this which has helped Norton Utilities become the best-selling data protection and recovery software in the world.



From Peter Norton, the leader in Macintosh utilities.

To learn more, dial FAST FAX 1-800-554-4403 and select option 1, document 411. (For information on easy network installation, choose option 1, document 481.) Better yet, pick up Norton Utilities at your local dealer for about $149.*

You should probably do it today, though. Before your luck runs out.

THE NORTON UTILITIES FOR MACINTOSH
SYMANTEC.

**Suggested retail price. Actual price may vary. All names are trademarks of their respective companies. For more information in Europe, call 31-71-353111. In Australia, call 612-879-6577. In Canada, call 1-800-465-2266. Everywhere else outside U.S., call 408-252-3570. ©1993 Symantec Corporation.*

hardware systems. The MAS software will also be able to run future Mac applications written exclusively for PowerOpen Architecture computer systems (which use PowerPC processors), and will automatically switch between the two types of code. The Finder and the current Mac applications run in an X window under A/UX while MAS emulates a 68040 processor.

Although running a processor emulation usually uses up a lot of processor power, MAS avoids most of this problem by running a PowerPC version of the Macintosh Toolbox, where applications use as much as 90 percent of their processing time, according to Apple. That version of the Toolbox will be used by current Mac applications with MAS mediating.

PowerOpen Architecture systems will be sold in various configurations by the members of the PowerOpen Association, which includes Apple, IBM, Bull, Harris, Thomson-CSF, Tadpole Technology, and Motorola, which is working with IBM to create the PowerPC line of microprocessors. The PowerOpen hardware and the MAS software are not expected to be available from Apple until sometime next year. Other members of the PowerOpen Association may ship hardware systems this year.—T.M.



LUIS DELGADO

THE 19-INCH MONOCHROME TWO-PAGE SCSI DISPLAY FROM LAPIS CONNECTS DIRECTLY TO A SCSI PORT.

Two-Page SCSI Display

LAPIS IS SHIPPING the Two Page SCSI Display, a 19-inch monochrome monitor that connects directly to the SCSI port of any Mac. The monitor offers 1024-by-828-dot resolution at a 75Hz vertical refresh rate, and costs $1249. Lapis Technologies, 510/748-1600.

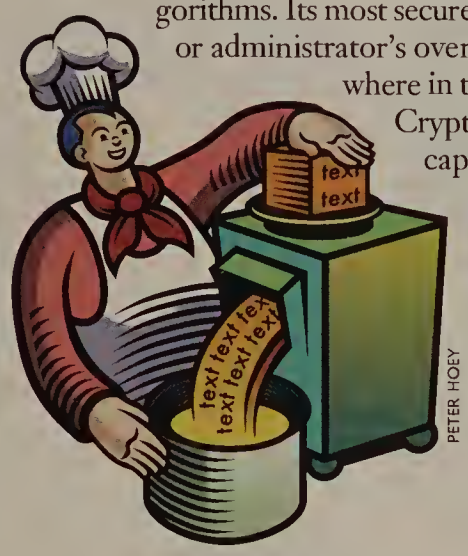
—CAMERON CROTTY

Automatic Encryption

Kent Marsh is developing an encryption utility that makes encrypting files or folders almost automatic. CryptoMactic supersedes the company's current encryption product, MacSafe II.

CryptoMactic is a System extension (MacSafe II is an application), so you can call up its window at any time with a key command, then encrypt files without moving them to a special folder. CryptoMactic can create self-decrypting files, similar to the self-expanding archives created by some compression utilities.

CryptoMactic provides DES, Cipher Block Chaining, and Triple DES, as well as some faster but less secure encryption algorithms. Its most secure option eliminates any backdoor or administrator's override by not storing the key anywhere in the document or in the program. CryptoMactic also has a secure delete capability that allows users to set the overwrite string and number of passes. Introductory pricing for CryptoMactic will be $99; final pricing was not set at press time. Kent Marsh, 713/522-5625.—D.L.



PETER HOEY

Game Publisher Defeats Secret Service

Steve Jackson Games, backed by the Electronic Freedom Foundation, has won its lawsuit against the Secret Service stemming from improper confiscation of the company's computer systems. Federal Judge Sam Sparks ordered the Secret Service to pay more than $50,000 to the company for lost profits and other expenses, and to pay attorneys' fees. The judge ruled that the Secret Service read, disclosed, and erased messages on an electronic bulletin board run by the company, violating its rights under the Electronic Communications Privacy Act and the Privacy Protection Act of 1980. The decision appears to extend to electronic communications the same standards of privacy that now apply to the mails and telephone conversations. The Justice Department may appeal the verdict.—T.M.

Dye-Sub Printer Makes Tabloid News

THE COLORRIGHT PLUS from Prime Option is a 24-bit color dye-sublimation printer that creates full-bleed, photo-realistic prints as large as tabloid size (11 by 17 inches). The printer comes with 32MB of RAM, which is enough to do a tabloid-size print, and holds up to 96MB for printing multiple tabloid pages. A 25MHz Weitek RISC microprocessor supports the printing of a tabloid-size page in about four minutes and a letter-size page in three minutes.

The ColorRight Plus comes with PostScript, PCL 5, and HPGL emulations, and it automatically senses the format of a file and switches between the emulations. It includes a serial port, an AppleTalk connector, two SCSI connectors, and a bidirectional parallel port. The company also offers an optional EtherTalk interface. A Chooser-level driver and a Windows driver are bundled with the printer.

Prime Option is shipping the ColorRight Plus at a list price of $19,750. An existing letter-size version of the printer, called the ColorRight, has a list price of $10,750. Prime Option, 310/618-0274.—T.M.

News

TouchBase, DateBook Tighten Ties

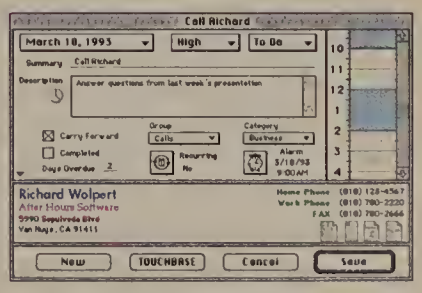
After Hours Software has announced updates to its calendar and address-book programs. Now called DateBook Pro and TouchBase Pro, the two programs are tightly linked via Apple events so that appointment and address data pass back and forth readily—for example, a DateBook Pro appointment can be made from within TouchBase Pro, or notes about a DateBook Pro contact can be posted to the TouchBase Pro notes field.

New features in DateBook Pro include longer data fields, a new memo record in addition to events and to-dos, the ability to see to-dos and memos in the week view, and improved holiday scheduling.

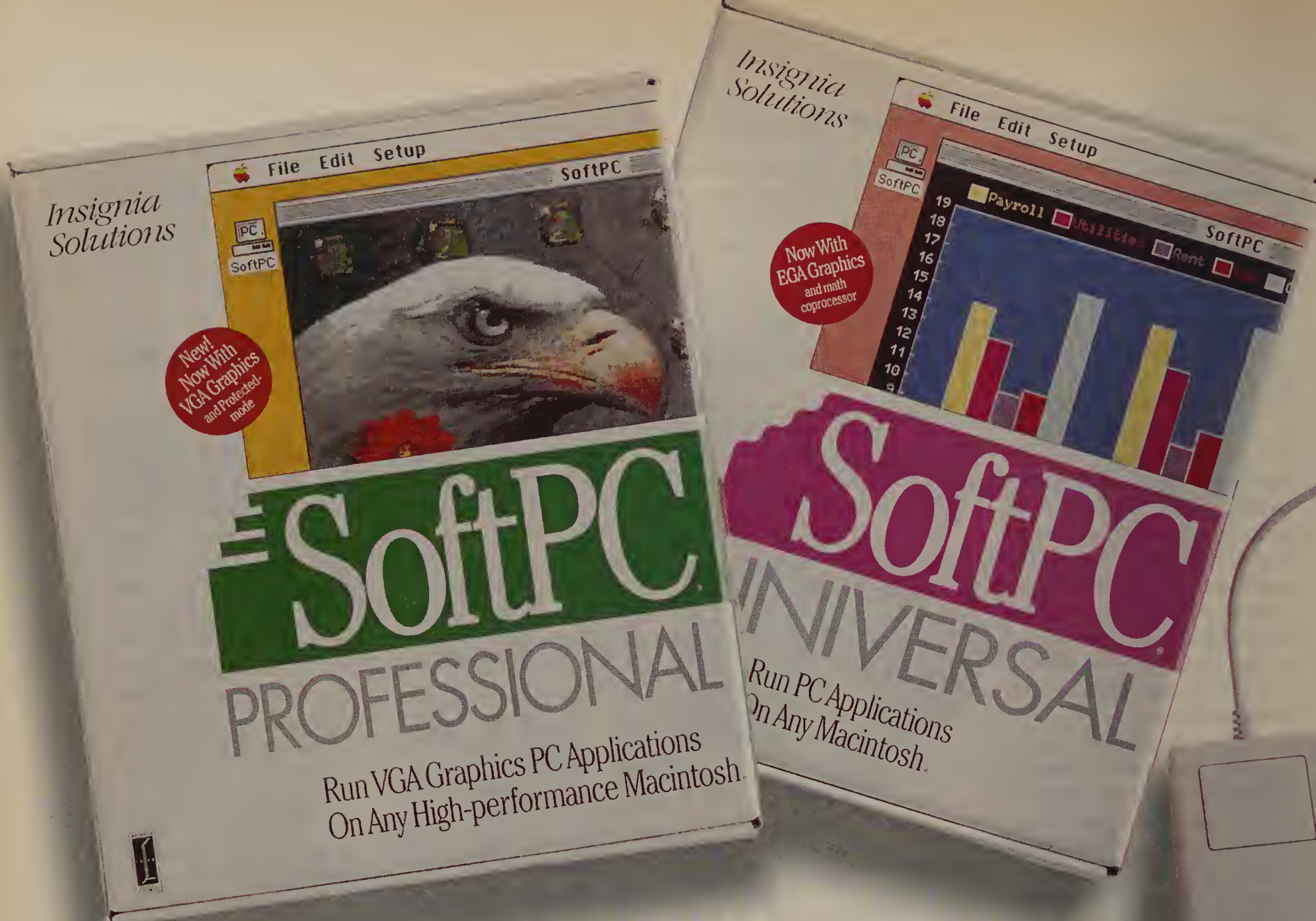
TouchBase Pro is now an application instead of a desk accessory, with a revamped user interface that provides multiple pages of address information, easier printing, and more custom fields. TouchBase Pro turns up the heat on competitor Portfolio Systems' Dynodex; Portfolio Systems plans a late summer update with customizable entry screens and list views, as well as links to future Portfolio products.

TouchBase Pro and DateBook Pro list for $149.95 for both or $79.95 each, down from $125 each. After Hours Software, 818/780-2220.

—TOM NEGRINO



A HIGH-PRIORITY TO-DO ITEM IN DATEBOOK PRO, WITH PHONE NUMBERS FROM THE LINKED TOUCHBASE PRO.



New SoftPC® 3.0. Extended Memory. VGA. MS-DOS® 5.0. Better Performance. Lower Price.

SoftPC Professional 3.0 for your Macintosh includes MS-DOS 5.0 installed and ready to go. Fast. With new enhanced emulation technology and a new lower price.

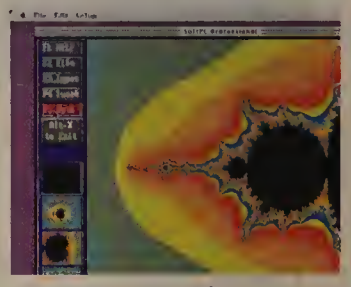
Now your Mac is completely compatible with PC software. You get everything a Mac can do, plus everything a PC can do, in 256 vibrant VGA colors.

SoftPC Professional's protected mode processor emulation provides extended memory, so you can run applications that require more than 640Kb of conventional PC memory. That means you can run more than 50,000 standard and custom PC applications. Lotus 1-2-3. PC Globe. Paradox. QuattroPro. Virtually any PC application.

And you don't have to give up your Mac to do it. In fact, you can easily copy and paste text and graphics from PC to Mac applications, so you get the best of both worlds.

SoftPC Professional even emulates an 80287 math coprocessor for faster calculations, and runs PC CD-ROMs with your Mac CD-ROM-drive!

If your PC applications don't require extended memory and VGA graphics, Universal SoftPC 3.0 is what you need. It runs on any Macintosh with a SuperDrive,® supports PC CD-ROMs and includes MS-DOS 5.0. All for a new lower price.



Now your favorite PC applications run in all 256 sharp, brilliant VGA colors on your Mac.

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Circle 72 on reader service card

Digital Claymation

From Will Vinton's animation studio, cradle of the California Raisins, comes Playmation, a 3-D modeling, rendering, and animation program that brings high-end, Claymation-style character-animation tools to the Mac at an affordable price.

Combining a spline-based modeler with powerful time-and-motion controls, Playmation can build organically shaped models and produce subtle, precise animations. Backbones made of splines allow objects to bend and twist realistically, and morphable surface vertices enable a character's skin to flex. Playmation includes five modules for modeling, animating, applying texture maps and material maps, choreographing, and ray tracing. Playmation lists for $566 but is currently available for $349.



PLAYMATION. CLAYMATION-LIKE BEASTS CAN BE MODELED, RENDERED, AND ANIMATED, THEN SUPERIMPOSED ON VIDEO.

Decal, an add-on for applying stretchable textures, and Render24, which supports YARC board acceleration, retail for $100 each. Anjon & Associates, 818/566-8551.

—CARLOS DOMINGO MARTINEZ

Portable Panel Eases Projections

AIMING FOR TRULY portable presentations, In Focus Systems has unveiled a notebook-size overhead LCD projection panel. The active matrix color device, called the PanelBook, can show 1.4 million colors at once, at a resolution of 640 by 480 pixels. The PanelBook measures 9.5 inches by 11.5 inches by 2 inches and fits in a briefcase. Like other In Focus panels, it comes with a remote control and can operate as a stand-alone device or be driven by a Macintosh or DOS machine.

In Focus began shipping the PanelBook in March at a list price of $59.95. In Focus, 503/692-4968.—T.M.



LUIS DELGADO

THE PANELBOOK FROM IN FOCUS SYSTEMS IS A COLOR LCD PROJECTION PANEL IN A NOTEBOOK SIZE.

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

Christmas Virus

TYPE: HyperCard virus
FIRST LISTED IN VIRUS WATCH: 7/93
INFO: A HyperCard script that infects the Home card and spreads to stacks
IMPACT: Nondestructive but can cause HyperCard to quit; may slow the Mac to a crawl

INIT 17

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 7/93
INFO: Infects applications and System file
IMPACT: May damage some files; sometimes crashes Mac Plus and SE

T4-C

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 6/93
INFO: A modified version of T4-A and T4-B
IMPACT: All three versions of T4 damage system files and applications

TREND

Motorola's Wireless Plans

One outgrowth of the recently announced General Magic TeleScript communications technology (see *News*, May 1993) will be Mobile Network Integration technology, an omnibus service from Motorola that will connect and coordinate many different kinds of wired and wireless communications. One part of the technology will provide transparent interconnectivity between existing, dissimilar wireless services. A second part will be software that will reside in hardware devices, in other communications services, and in application programs.

When the two parts are combined, users will be able to send data to and receive data from free local networks or phone lines, pay-for-use nets, and long-distance lines; users will send and receive through the same device and pay only for requested services through one integrated bill. For example, a college student using a single wireless device could receive information faxed from the campus library, log on to the university computer center at a set fee, receive notification that his or her parents had made a deposit in his or her checking account, and make the traditional collect call thanking them. The service will also be able to choose the transmission method that costs the least, and users will be able to set a limit on the amount they want to spend on a specific job.

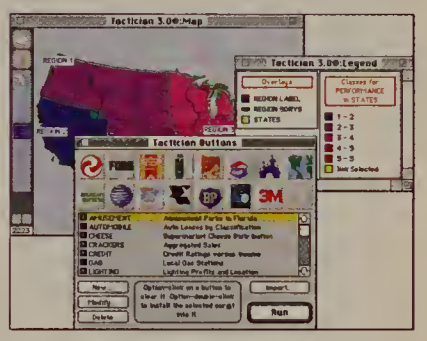
The global service will span all time zones, and users will be able to set a series of interruption filters, so it will not deliver any messages during certain times (except perhaps from someone named Mom). Motorola announced the technology in the latter part of April.—T.M.

News

Map Your Market

TO PLAN AND ANALYZE marketing efforts requires looking at the location of various market factors. Tactician correlates street and regional maps with demographics and data on stores and shopping malls, product brands, competitive status, and so on, to help establish retail sites or designate sales territories. Tactician 3.0 has a new suite of sophisticated add-ons.

Version 3.0 comes in three packages: the $995 Tactician; the $2495 Tactician with Buttons, which includes a scripting

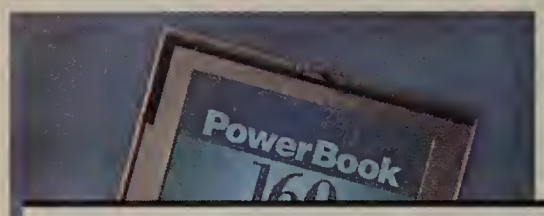


TACTICIAN WITH BUTTONS HAS TOOLS FOR CREATING CUSTOM PROGRAMS BASED ON TACTICS' DATA-MAPPING ENGINE.

language that turns Tactician into a custom-application generator; and the $9995 Heavy Duty Tactician, which provides six data-analysis models. These include a gravity model, for estimating how attractive a site will be to customers; a drive-time model, to determine if the customers you want are within driving distance of a proposed site; and a regression model, to figure out how factors such as advertising or package size influence which brands sell.

Heavy Duty also incorporates the new Data Warehouse, designed for large companies that need to distribute CD-ROMs containing corporate marketing data to their regional offices. Tactics International also sells a wide range of geographic and marketing information. Tactics, 508/475-4475.—D.L.

Without *training*, thousands of dollars already spent on computers and software is needlessly wasted.



"...just one short-cut on your Word video saved me 20 minutes of set-up time, not to mention frustration..."

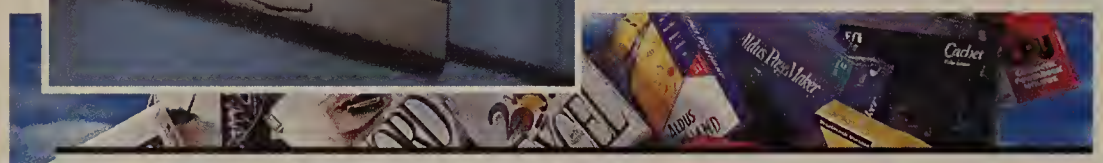
Harland Anderson - Computer Consultant

$3,800 Wasted Without TRAINING!

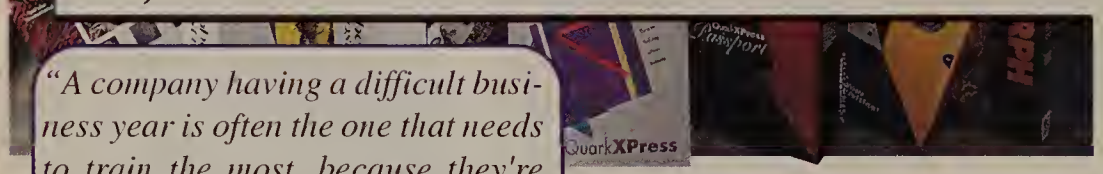


"As a result of your videos my Mac is running lean and mean..."

J. J. Johnson - San Jose, CA



$1,800 Wasted Without TRAINING!



"A company having a difficult business year is often the one that needs to train the most, because they're clearly in a competitive situation where it's even more important to elevate the skills of their people...We find the BEST RETURN ON ANY INVESTMENT COMES FROM TRAINING...your rewards go for the lifetime of the employee rather than just for the lifetime of the equipment." Tom Peters

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- ☐ Adobe Illustrator 3.2 (3)
- ☐ Adobe Photoshop (1)
- ☐ Adobe Photoshop (2)
- ☐ Adobe Photoshop (3)
- ☐ Adobe Photoshop (4)
- ☐ Aldus Freehand (1)
- ☐ Aldus Freehand (2)
- ☐ Aldus Freehand (3)
- ☐ Aldus Freehand (4)
- ☐ Aldus PageMaker (1)
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- ☐ Claris MacProject II (3)
- ☐ Claris MacWrite II (1)
- ☐ Claris MacWrite II (2)
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- ☐ Microsoft Excel (5)
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- ☐ Microsoft Word (1)
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- ☐ Microsoft Word (3)
- ☐ Microsoft Word (4)
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- ☐ Microsoft Works (2)
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- ☐ Microsoft Works (4)
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$49/ea.

Circle 106 on reader service card

News

Plug-and-Play ISDN

France-based Euronis is shipping its $1695 Planet-ISDN NuBus board for connecting an individual Mac to the Integrated Services Digital Network (ISDN), either directly to an ISDN-capable PBX or through an interface supplied by local telephone companies. The board supports the European and U.S. National standards, which provide three digital channels, two at 64 Kbps and one at 16 Kbps. One 64-Kbps channel emulates a Hayes-compatible modem while the other provides digitized voice services (the 16-Kbps line is a control channel). Bundled software includes a driver for the Mac's Communications Toolbox and a program for setting up voice mail, call-monitoring, and other digital telephony systems. The board also supports two software products from Access Privilege: the Link, a $449 AppleTalk internet router for connecting remote networks via ISDN; and the $299 Easy Transfer, an automatic compression and file-transfer tool. The Access products are available through Euronis. Euronis's line is distributed in the United States by Compression Labs, 408/435-3000.—MEL BECKMAN



PETER HOEY

TREND

ISDN and Beyond

Multimegabyte sound and video files swamp today's modem-based telecommunications. Three different emerging services promise to dilate the dial-up bottleneck: Integrated Services Digital Network (ISDN), Asynchronous Transfer Mode (ATM), and Switched Multimegabit Data Service (SMDS).

ISDN is available today in most metropolitan areas at pricing comparable to business voice service and uses existing copper telephone wires to provide two 64-Kbps data channels and one 16-Kbps control channel. For ISDN service, contact your local telephone company. For interface hardware, Hayes's ISDN division (415/974-5544) has a long track record with Mac ISDN products (also see "Plug-and-Play ISDN," at left).

ATM will overcome ISDN's fixed-speed channel limits by breaking messages into pieces so that some pieces can be sent during slack moments. ATM will run over copper wires at up to 1.5 Mbps, or over optical fiber at 1200 Mbps. Copper-based ATM (still five years off in the United States) will match ISDN pricing. Fiber-based ATM is a decade away, due to the high cost—about $10,000 per user—of replacing the local copper network. Copper-based SMDS at 1.5 Mbps is available now; it costs about twice as much as ISDN but offers variable speeds like ATM. Broadband SMDS will run exclusively on fiber, at speeds of 45 Mbps.—MEL BECKMAN

Text Retrieval Fills In the Blanks

Go d Lu k. Did you just read *Good Luck?* Look again. Your adaptable mind found a pattern and filled in the blanks. Excalibur's PixTex/EFS (Pictures and Text/Electronic Filing System), which archives and retrieves text and images, also uses pattern-recognition techniques to retrieve information. Most existing text-searching databases index every word, but PixTex indexes every letter so that, for example, by looking for letter patterns such as *go* near *lu*, PixTex could recognize those word fragments and retrieve documents containing the phrase *good luck*. This unusual ability to recognize word fragments enables PixTex to find words that have been misspelled in the database or by the user writing the query. The application can also find text converted from OCR scans of damaged or dirty documents.

PixTex/EFS runs on a Unix or VMS server, with client software available for the Macintosh, DOS PCs, and other platforms. A 50-user system, including any combination of clients, costs $3420 per person. The system can archive digital files or scanned data (OCR capability is included in the system), and Excalibur is also developing pattern-recognition technology for analyzing images, as well as voice and signal data. Excalibur, 619/625-7900.—DANIEL W. RASMUS

Itsy-Bitsy Ethernet

THAT BULGE IN YOUR jacket pocket might be Asanté Technologies' tiny new Ethernet adapter. The Mini EN/SC plugs into a SCSI port, weighs 6 ounces, and is roughly the size of a cassette tape box (4.3 inches by 2.75 inches by 1 inch). The adapter has ports for both 10BaseT and thin Ethernet; automatically senses which kind of network it's connected to; and features LEDs for termination, power, and network activity.



TOM GIBSON

ASANTÉ'S MINI EN/SC IS A PORTABLE SCSI-TO-ETHERNET ADAPTER THAT WEIGHS ONLY 6 OUNCES.

Asanté attributes the small size of the Ethernet unit to the fact that it has one DB-25 SCSI connector instead of the usual two. The company compensates with special Y cables but says that conforming to SCSI specifications is the major limitation in further reducing the size of the device. Users can set the SCSI ID and termination with external switches, and the adapter ships with two Y SCSI cables: an HDI-30/25-pin/25-pin cable, and a 25-pin/25-pin/25-pin cable for connecting to desktop Macs. Asanté also includes a thin coax T-connector and a 12-foot UTP cable.

The Mini EN/SC lists at $459; a 10BaseT-only version, the Mini EN/SC-10T, lists for $399. Both are currently shipping. Asanté, 408/435-8388.
—CAMERON CROTTY

600-dpi Laser Printer for under $2000

INTENDED FOR individuals and small workgroups, the QMS 420 Print System is a high-resolution, 4-ppm laser printer that lists for $1995. The device offers true 600-by-600-dpi resolution and a faster 300-by-300-dpi mode. The QMS 420 has the same multiple active ports and emulation-switching as the QMS 410 laser printer, which QMS reduced from $1995 to $1595 list.

The 420 includes PostScript Level 1 and Level 2, PCL 4, and HPGL interpreters; a serial port; a parallel port; and a LocalTalk connector. The printer ships with a 68020 processor and 6MB of RAM, with a maximum of 10MB possible. There are 39 resident typefaces, and an optional board provides another 16 typefaces. QMS said it expects to begin shipping the QMS 420 Print System in May. QMS, 205/633-4300.—T.M.


PHILIP KAAKE

THE QMS 420 PRINT SYSTEM IS A 600-DPI LASER PRINTER THAT DOES 4 PPM AND LISTS FOR $1995.

Every Mac Deserves Big Color

When it comes to big-screen color, your LC, SE/30 and Performa™ 400 now have the same potential as a Mac® II or Performa 600. The new Lapis™ ProColorServer™ display cards bring full color capability to every color-capable Mac. That means really big screens – up to two full pages. And as many colors as you want – 16,777,216 to be exact.

Now you can add 24-bit color to your LC. Expand your SE/30 with a 21-inch color display. Bring out the colorful best in your Mac II or Performa 600.

Lapis has a full range of display products that improve the look and productivity of all types of Macintosh® computers, from the Plus to the Quadra™. With the highest reliability and best prices in the industry.

Call **1-800-43-LAPIS** today to find out more about ProColorServer display cards.
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LC & LC II	✦	✦	✦
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Performa 400	✦	✦	✦
Performa 600	✦	✦	✦
Mac II/Quadra	✦	✦	✦

ProColorServer display cards are available in 8-bit, 8•16-bit, and 8•16•24-bit versions, and support monitors from 13" to 21", with resolutions ranging from 640 x 480 to 1152 x 872. Lapis also offers a full line of DisplayServer™ and PowerBase™ monochrome display adapters for all Mac systems ranging from the Plus to the Quadra.



Circle 258 on reader service card

Trademark/Owner Macintosh, Mac, Performa, Quadra/Apple Computer, Inc.; ProColorServer, DisplayServer, PowerBase, Lapis/Lapis Technologies, Inc.

News

TURKEY SHOOT

DESIGN FLAWS NOTED

QuarkXPress and MacWrite Pro True, Denver-based Quark and Bay Area–based Claris aren't exactly neighbors, but that's no reason not to talk—and no excuse for not being able to import MacWrite Pro files into QuarkXPress. (One of the companies may make the necessary filter available someday.)

4D 3.0 Planning to make those data-entry forms pretty? Then plan on spending some time drawing little boxes, because 4D's Layout Editor can only draw a box around one field at a time.

Microsoft Works 3.0 Remember those old-fashioned form letters, the kind with blank spaces between the words? Works can give your mail merge the same Early Computer look too, at least for records with empty fields.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld.*

Putting the Moves on 2-D Models

HOW DO THINGS really move? For example, how far does a turning engine swing a piston on its cam? What happens to a pile of boxes when a dog leaps into them? For engineers and animators those are difficult questions that Knowledge Revolution's new Working Model helps answer.

Working Model lets you draw objects, connect them in hierarchical relationships, set their physical properties and the forces that affect them, and then put the whole model in motion to simulate their interaction. Working Model resembles Knowledge Revolution's educational package Interactive Physics II, but has high numeric accuracy and additional tools. It can import DXF format CAD files and export in DXF, QuickTime, Macromedia Three-D, and Silicon Graphics–based Wavefront formats. Though Working Model models are strictly 2-D, they appear as extruded 3-D objects when imported into Wavefront or Macromedia Three-D, where they retain Working Model's precise motion and can be rendered with the 3-D programs' tools. Working Model lists for $995. Knowledge Revolution, 415/553-8153.—D.L.

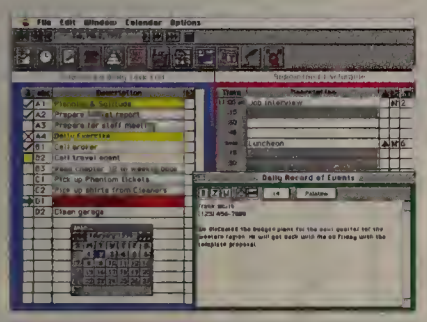


UNICYCLE PHYSICS. WORKING MODEL CAN EXPORT DATA IN REAL TIME FROM THE MODEL TO GRAPHING OR OTHER PROGRAMS.

Franklin Has Plans for You

Most Mac calendar-keeping software has templates to print in Franklin Day Planner format. Now Franklin Quest is publishing its own calendar software, called Ascend, which incorporates some of the Franklin time-management system's more esoteric elements.

Standard calendar software tools include repeating events, alarms, and a built-in address manager that prints envelopes. Ascend also implements Franklin's Productivity Pyramid, a system of defining long-term goals and breaking them down into a series of day-by-day tasks. The Master Task List lets you prioritize tasks and back-burner those tasks you delay repeatedly without deleting. Ascend's Red Tab feature mimics the blank pages in the back of a Day Planner with a mini–word processor for taking notes. Ascend is $199. Franklin Quest, 801/975-9992.—D.L.



FRANKLIN'S ASCEND IMPLEMENTS THE DAY PLANNER'S PRODUCTIVITY PYRAMID IN A DIGITAL CALENDAR.

Avid Debuts Lower-Cost Media Composer

AVID TECHNOLOGY, MAKER of high-end digital video-editing systems, has brought out Media Composer Model 210, a combination NuBus board and editing-suite software that lists for $14,995, considerably less than previous models. The package can create edit-decision lists in Ampex, Avid, CMX, GVG, Paltex, and Sony format for export to those machines and for combining the source materials in the correct edited order. The Model 210 includes JPEG compression, an image database for storyboarding, serial-port control of a videotape recorder, and multicamera editing.

The Model 210 comes with a JPEG board, a video input/digitizer board, and an audio digitizer/digital-to-analog conversion board. The product requires a Mac IIci, IIfx, IIvx, Quadra 900, or Quadra 950, and a hard drive that stores 1.2GB or more. Users can choose between AVR1 resolution, which uses less storage space, or AVR2 for higher image quality. The Model 210 began shipping in January in NTSC and PAL versions. Avid, 508/640-6789.—T.M.

Desktop Cameras: Seeing Is Believing

As the age of the Jetsons approaches, no self-respecting technophile will be without a computer videophone. Workstation Technologies Inc. (WTI) aims to make its miniature camera a standard part of desktop computing. The black-and-white video camera is slightly larger than the Mac mouse, rests on top of the monitor, and can be adjusted by the user to tilt up or down. The camera provides standard NTSC or PAL output and requires only a digitizing board to work with a Macintosh. A color version is in the works and may become available later this year. WTI is also examining the possibility of including a microphone in the camera.

VideoLabs has a slightly more futuristic design vision for its color desktop camera, called the FlexCam. A lens-and-microphone-equipped head snakes up on a flexible gooseneck stalk from the unit's base, which houses the camera's electronics. The device provides NTSC video output (a PAL version is available, and an S-Video version is under development), as well as stereo audio. VideoLabs plans to sell the FlexCam directly to end users as well as to OEMs, and they are currently prototyping a complete video-conferencing product. Workstation Technologies, 714/250-8983; VideoLabs, 612/897-1995.

—CAMERON CROTTY



RICHARD RETHEMEYER

WORKSTATION TECHNOLOGIES' MULTIMEDIA BLACK-AND-WHITE CAMERA (LEFT) AND VIDEOLABS' FLEXCAM (RIGHT).

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Circle 92 on reader service card

News

File Synching for PowerBooks

MOST NEW TECHNOLOGIES come with drawbacks, and for PowerBook owners who also use desktop machines, the biggest drawback is keeping track of which Mac has the latest version of their files. Leader Technologies has revised PowerMerge, its file-synchronization program, to version 2.0, adding features that go beyond copying files back and forth between the mobile and desktop Macs. For example, PowerMerge can compare files, identify and move changed blocks of text between two versions of a text file, and via Apple events, can signal other programs to reconcile the contents of documents they have created.



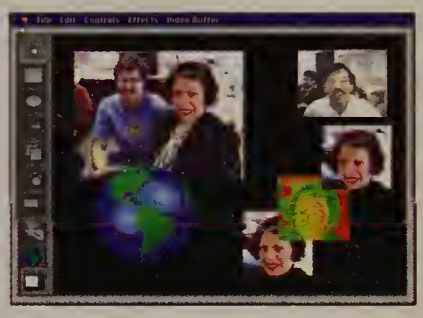
PETER HOEY

PowerMerge also offers improved reconciliation for files that have been moved, renamed, or deleted on one disk. PowerMerge 2.0 synchronizes on start-up, which is especially useful for Duo owners because files are automatically synchronized when the Duo is placed into the Duo Dock and booted. PowerMerge 2.0 also has improved viewing formats so that the user can see subsets of the file lists. PowerMerge has a list price of $129. Leader Technologies, 714/757-1787.
—TOM NEGRINO

QuickerTime?

QuickTime on the Mac is fine for offline editing or playing of low-res, saltine-size digital movies. But full-screen video at the normal frame rate and resolution requires special tools. MainStream Control is developing software and chips to digitize video and apply special effects in real time. MainStream's Stream Engine technology can manage up to 256 layers of video, creating wipes and fades, horizontal and vertical mirror images, transparency, and other effects.

MainStream says the first Stream Engine product to ship will be a video-effects board from a company that makes special-purpose accelerator boards; another company, which markets software for QuickTime, will modify its software to support those boards. MainStream expects other companies to apply the Stream Engine technology to tasks beyond editing video, such as video-conferencing and virtual reality. MainStream, 408/987-3222.—D.L.



STREAM ENGINE'S SPECIAL EFFECTS. DUPLICATION, CROPS, AND TRANSFORMATIONS ARE APPLIED TO LIVE VIDEO.

Novell Puts IPX on the Mac

NOVELL'S MACIPX implements IPX/SPX, Novell's transport protocols, on the Macintosh for the first time. Previously, Macintoshes on networks running NetWare, Novell's server-based network operating system, had to use AppleTalk or TCP/IP as a transport protocol. In contrast, DOS and Windows PCs on NetWare networks typically use IPX/SPX. By providing a common transport protocol between Macs and PCs, MacIPX offers companies that use NetWarean alternative to installing AppleTalk on their PCs or using TCP/IP.

The MacIPX developers' kit ($295) enables software vendors to write Macintosh-to-PC peer-to-peer applications, where Macs and PCs can communicate directly with each other via IPX/SPX rather than through a NetWare server. For example, Claris will use MacIPX to let a Macintosh running FileMaker Pro 2.0 for Macintosh (due in July) communicate directly over a NetWare network with a PC running FileMaker Pro 2.0 for Windows. MacIPX also makes it easier for developers to port DOS or Windows applications that already run on IPX/SPX to the Macintosh, since they no longer have to support a different transport protocol.

The MacIPX developers' kit, which shipped in April, includes source code for the MacIPX application programming interface and drivers for LocalTalk, Ethernet, and Apple's implementation of token ring. Vendors can write their own Link Access Protocol interface to support FDDI or other vendors' token ring implementations. Hardware and software vendors are expected to incorporate the source code and distribute the drivers with their products that support MacIPX. Novell, 801/429-7000.
—ELIZABETH DOUGHERTY



SCOTT PETERSON

THE COACTIVE MAC-TO-PC CONNECTION IS DESIGNED TO LINK MACS AND PCS IN SMALL WORKGROUPS.

Simply Linking Macs and PCs

Coactive Computing has introduced the Coactive Mac-to-PC Connection, a simple way of linking Macs and PCs. The $179 product includes a small hardware device with a microprocessor, cables, and software. The microprocessor allows the device to configure itself with the appropriate network driver and directories when attached to a DOS machine's parallel port. The Coactive Mac-to-PC Connection works over Ethernet or Token Ring nets, including those carrying the AppleTalk protocol. The company expects to ship the device beginning in June. Coactive, 415/802-1080.—T.M.

BUG REPORT

Adobe's SuperATM Sometimes creates a corrupted Desktop file when desktop is rebuilt. Only occurs on Macs without an external hard drive or Suitcase. Adobe is developing a bug-fix; further details were not available.

Adobe Type Manager 3.0 Cannot print manipulated text on the HP DeskWriter using its current driver, version 3.1. Adobe will make a bug-fix available to registered owners for $7.50 shipping and handling.

Excel 4.0 Cannot import a delimited text file if the first field's name is ID. Microsoft is uncertain of the cause.

Times Two 1.01 Creates a large invisible file, reducing compression factor to 1.5:1 on smaller disks. Golden Triangle says version 1.02 reduces this overhead and that the new version will be sent to all registered users at no charge.

Norton Essentials for PowerBook 1.0 Random hangs on PowerBook 180 and Duo 230. Symantec is uncertain of the cause.

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Circle 90 on reader service card

News

SyQuest Shrinks Disk, Grows Storage

SyQuest has a new 3.5-inch removable-cartridge drive mechanism (3105S) that has already landed in several manufacturers' cases. Each cartridge carries up to 105MB after formatting, and SyQuest claims a 14.5ms average seek time.

PLI promptly added the new baby to its Infinity line, while Mass Microsystems is selling the new SyQuest drive under the DataPak name. Both Mass Micro and PLI are charging $949 for an internal version and $1049 for an external version of the drive.

Other vendors who have plans for the new mechanism but were not ready to announce pricing at press time include Procom Technology, APS Technologies, CMS Enhancements, Mac Products USA, and Relax Technology.

SyQuest is also working on transferring the new storage technology to the company's existing 5.25-inch format and is developing a drive that would provide up to 200MB on a single cartridge and would also read and write existing 44MB and 88MB cartridges.
—CAMERON CROTTY

THE AMCOEX INDEX OF USED MAC PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	$600	-$50
Mac Portable/1MB/40MB	$700	+$50
PowerBook 100/4MB/40MB	$1000	+$50
PowerBook 140/4MB/40MB	$1550	+$50
Mac Classic/2MB/40MB	$650	$0
Mac SE/30/2MB/40MB	$1075	-$125
Mac LC/2MB/40MB	$650	$0
Mac II/4MB/40MB	$950	-$200
Mac IIsi/3MB/40MB	$975	+$75
Mac IIcx/4MB/80MB	$1300	-$50
Mac IIci/4MB/80MB	$1850	+$100
Mac IIfx/4MB/80MB	$2250	+$50
Apple 12-inch B&W display/board	$125	$0
Apple 13-inch RGB display/board	$400	+$25
LaserWriter Plus	$700	-$25
LaserWriter IINT	$1075	-$25

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717); reflects sales during week of April 21. Configurations include keyboard and exclude monitor and display board for noncompact models.

TOP FIFTEEN BUSINESS SOFTWARE PACKAGES

Months on chart	Last month	This month	
20	3	1	**Microsoft Office** *Microsoft Corporation*
89	2	2	**Microsoft Excel** *Microsoft Corporation*
98	1	3	**Microsoft Word** *Microsoft Corporation*
75	5	4	**Microsoft Works** *Microsoft Corporation*
50	4	5	**FileMaker Pro** *Claris Corporation*
12	7	6	**ClarisWorks** *Claris Corporation*
19	6	7	**MacDraw Pro** *Claris Corporation*
50	9	8	**WordPerfect for the Macintosh** *WordPerfect Corporation*
38	10	9	**QuarkXPress** *Quark*
13	12	10	**1-2-3 for the Macintosh** *Lotus Development*
36	8	11	**Quicken** *Intuit*
28	11	12	**MacProject** *Claris Corporation*
73	14	13	**MacWrite II** *Claris Corporation*
71	—	14	**MacDraw II** *Claris Corporation*
85	13	15	**Aldus PageMaker** *Aldus Corporation*

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during March 1993.

Mac Software Invades Alien Computer

ANY MAC LOVER STUCK with a Unix box can run Mac software by using emulation products like Xcelerated Systems' Liken.

Liken puts a Mac inside an X window on a Hewlett-Packard Precision Architecture RISC system or a Sun Sparcstation (Xcelerated is also working on IBM RS/6000 support). Liken has some limitations: it emulates a 68000-based Mac and runs System 6.0.7, so it can't show color or run applications that require System 7 or a 68030 or 68040 processor. The company claims that Liken runs at IIsi speed on a Sparcstation. Liken is $695 for one user. Xcelerated Systems, 619/576-3080.

Quorum's competing product, Equal, should ship this spring (see "Better Than a Mac Clone?" *News*, May 1992). Quorum's approach differs from Xcelerated's, in that Mac applications take on a Unix Open Look or Motif interface, and the company plans to certify Macintosh applications as being Equal-compatible. Equal will be $695 for the Sparcstation and the SGI Indigo. Quorum, 415/323-3111.—D.L.



XCELERATED SYSTEMS' LIKEN WITH SEVERAL MAC FINDER WINDOWS OPEN IN A WINDOW ON AN HP RISC SYSTEM.



PETER HOEY

Polyglot Word Processor

The word processor Nisus 3.4's two versions have special tools for foreign languages. Nisus Complete Flag supports Apple's System 7.1 extension WorldScript, which can switch between different languages' character sets with the flick of a mouse. Nisus Software ships WorldScript modules for Russian, Eastern European languages, Arabic, Hebrew, and Persian at $45 each, and one is included free with the $495 program. (Complete Flag is hardware-key copy-protected.) The $395 Limited Flag supports most European languages under System 6.0.7 or later. Nisus 3.4 has other new features for working in foreign languages, and adds tracking and drag-and-drop editing.

Nisus has a full set of high-end word processor features such as page-layout and drawing tools, but the program is really distinguished by its built-in macro language and its pattern-matching (known to Unix users as GREP, or generalized regular expression parser). Pattern-matching is a powerful search-and-replace tool that performs such tasks as going through a mass of names and addresses, separating the elements, and inserting tabs between them. Nisus Software, 619/481-1477.—D.L.
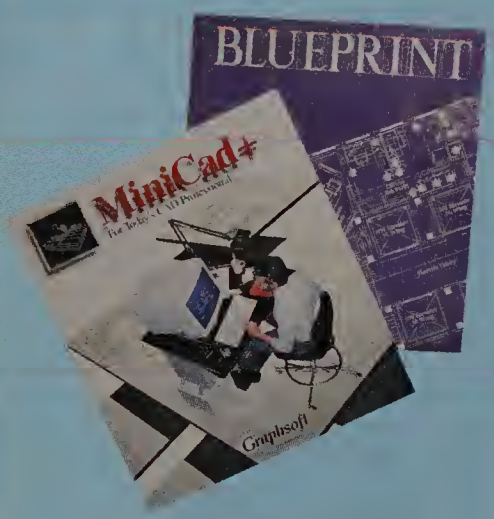
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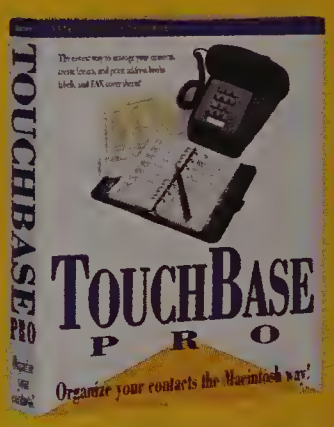
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CAD0024 $219*
Publisher: GraphSoft

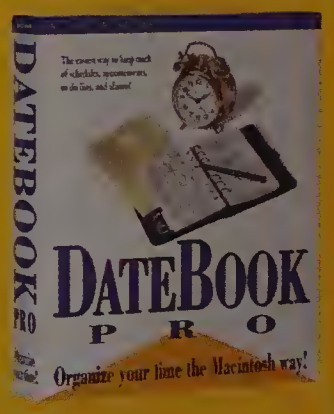
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TouchBase Pro/DateBook Pro Bundle

❼**ALL NEW!** The award winners just got better. TOUCHBASE and DATEBOOK have turned PRO! Now, a contact manager that provides power and ease of use, and a time manager that has the flexibility to track all your daily activities. With TOUCHBASE PRO, you can manage your contacts, dial your telephone, write letters, and print address books, labels, envelopes and fax covers. DATEBOOK PRO combines calendars, appointments, To Dos, alarms and reminders to keep you on time. Best of all, TOUCHBASE PRO and DATEBOOK PRO are completely integrated. Together they form the **BEST** in personal information management.
Publisher: After Hours Software
BUS0299

$89



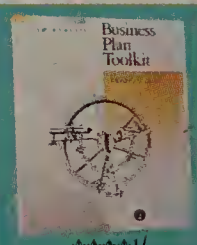




DesignCAD 2D/3D

❼"This is all the capability many designers will ever need. Its price/performance ratio makes it a package we must recommend" *BYTE MAGAZINE*. DesignCAD for the Mac combines both 2D drafting and 3D modeling into one great package. Built from the ground up, not a port-over, DesignCAD offers Floating Point Precision. DesignCAD comes complete with: Isometric, perspective, and orthographic viewing; associative dimensioning; automatic scrolling; tolerance options; arrowhead choices, and much more!
Publisher: American Small Business
CAD0043

$155



Business Plan Toolkit

❼Uses a unique interview technique which *MacUser* said, "guides you in a thoughtful, creative manner". Contains a menu-driven text guide, financials and business charts, fully-linked forecasts, cash flow, P&L, balance, and ratios. Awarded 4.5 mice by *MacUser* (8/92).
FIN0116 $75

★★★★½



Sales and Market Forecasting Toolkit

❼A powerful aid for making sales predictions using five different techniques. Unlike fill-in-the-blank programs—it actually transfers business know-how. Awarded 4.5 mice by *MacUser* (5/90).
Publisher: Palo Alto Software
BUS0300 $75
Both require Spread Sheets.

★★★★½

$75 ea.







Star Trek™: The Screen Saver

❼Beam aboard the Enterprise™ with Captain Kirk and Mr. Spock on a mission to prevent screen burn-in. Encounter trilling Tribbles, Klingon battlecruisers, and burrowing horta. This all new screen saver provides over 15 animated displays, password protection, SystemIQ and full compatibility with After Dark.
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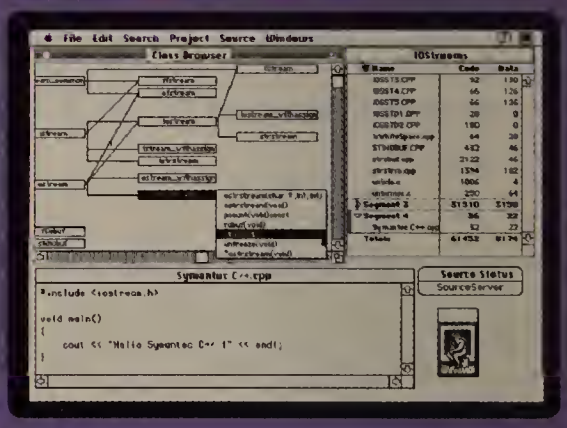
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❼The Ultimate Screen Saver Collection. Over 30 displays including Flying Toasters and Fish! With sound and password protection. More After Dark—Over 25 incredible new displays for After Dark.
UTI0231 $42*
Publisher: Berkeley Systems
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$42*

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C++



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Publisher: Symantec
LNG0062

$345

Help!

❼Help! is an intelligent application which pinpoints conflicts, incompatibilities and other problems on your Mac. With Help!, you can clean up your configuration and improve your Mac's efficiency. The program analyzes your system using a knowledgebase of problem-solving information covering more than 3,300 products. After performing its analysis, Help! creates an easily understood report that describes all problems detected and tells you exactly how to solve them. Help! detects conflicts, incompatibilities, improperly installed files, environmental problems, damaged files, and duplicate files.
Publisher: Teknosys
UTI0251



$89

Infini-D 2.0

❼Winner of the 1992 *MacUser* Eddy for Best 3D Package! Infini-D 2.0 combines a friendly interface with 3D power: instant conversion of EPS files into 3D objects, awesome animation capabilities, and QuickTime support. Infini-D is the 3D package of choice for graphics and multimedia professionals.
GRA0303 $699

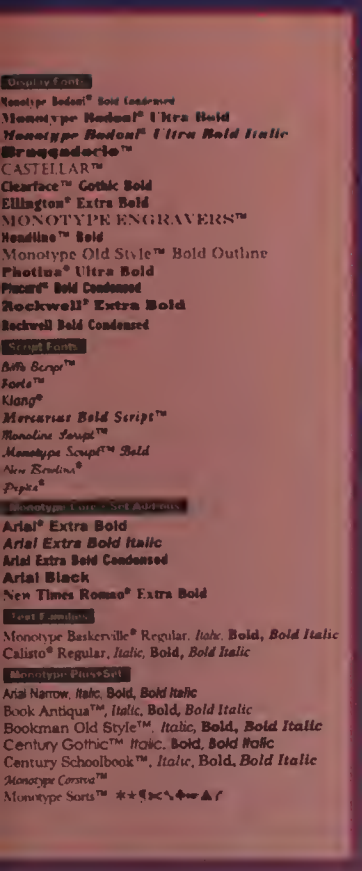


BackBurner*

❼BackBurner is the distributed network renderer for Infini-D. Run BackBurner alone, or add an unlimited number of BackBurner Engines and watch the magic of parallel processing burn up your rendering time!
GRA0136 $105*
Publisher: Specular International

$105*

Circle 150 on reader service card



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Kaboom! is 150 wild and wacky sounds that you can add to the everyday functions of your Mac. Amaze your friends and colleagues with the sounds of traffic jams, screams, and ringing phones— even famous sound bytes from "Twilight Zone," "I Love Lucy," Ronald Reagan and more! Never settle for a simple beep again! (Publisher: Nova Developement)



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❼Cachet, Editor's Choice for "Software Product of the Year"-*MacUser*, lets you edit desktop color images in a remarkably intuitive and accurate way by using your own eyes! With Cachet's unique Edit-by-Reference feature, you'll never make another printing mistake because you adjust the on-screen colors of your image to match a reference image that has already been printed. Other features include MultiChoice, a quick way to correct color, EfiColor for matching color to any printer and more!

Publisher: EFI GRA0432

$399

IntelliDraw

❼Aldus IntelliDraw is the fastest, most innovative new drawing program-so unique that it actually does much of the drawing for you. Professional-looking technical diagrams, business or engineering graphics, architectural renderings, flow charts, org charts, space plans, logos, maps, forms, presentations and much more are all a snap to draw. Create symmetrical graphics instantly with the exclusive Symmetrigon™. Ready-to-use clip art and smart templates, plus an instructional videotape, gets you started immediately.

Publisher: Aldus GRA0354

Also available: **IntelliDraw Competative Upgrade SID0028 $99.**

$199





PowerPoint 3.0

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Publisher: Microsoft BUS0269

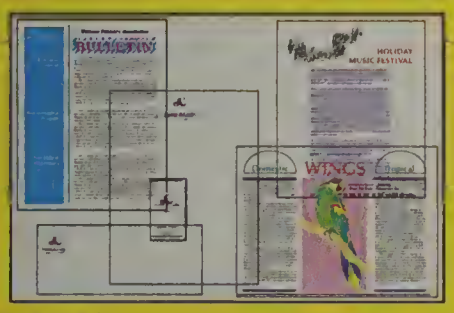
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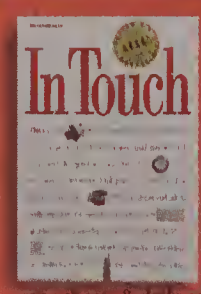
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by James A. Martin

Hands-On: Photo CD

Macworld puts Photo CD to the test

Unless you've been in a cryogenic state for the past three years, you've probably seen the TV commercials, print ads, and other hoopla regarding Photo CD. Announced in September 1990, but not showing up in tangible form until late 1992, Eastman Kodak's Photo CD offers an inexpensive way to create and access digital photos—from viewing photos on your TV, to editing images on a Mac or other PC, to creating your own multimedia disc (see "Five Things You Can Do with Photo CD Now").

But this heady promise raises several questions: How good is the image quality? What hardware and software do you need? Will having images on a Photo CD truly save time and money, compared with digitizing them with a desktop scanner? The biggest question: Is Photo CD just another heavily hyped application of technology in search of a market—Kodak plans to spend a mind-boggling $34 million in 1993 to promote Photo CD—or does Photo CD actually offer something truly worthwhile and useful?

I asked these questions when putting the Photo CD process through its paces. For this article, I shot several rolls of film, dug up some old negatives and slides, and dropped some of this material off at one camera store, the rest at another, to be transferred onto Photo CD discs. Then I viewed, edited, exported, and printed the image files on the discs.

The Official Story

HERE'S HOW THE PHOTO CD SYSTEM works, as promised by Kodak: take any roll of 35mm film and drop it off at a Photo CD outlet—which could be anything from a corner drugstore to a professional photography lab. To find an outlet near you, call Kodak's toll-free line (800/242-2424, ext. 36).

Within five to seven days after dropping off the film, you'll receive a shiny gold compact disc (and a set of prints if you choose), along with negatives or slides. The disc contains five scans of each image: wallet size, 128 lines by 192 pixels; snapshot, 256 lines by 384 pixels; standard, 512 lines by 768 pixels; large, 1024 lines by 1536 pixels; and poster, 2048 lines by 3072 pixels. Each of the five image scans is contained within one file, which Kodak calls an *image pack*. Each image pack is compressed to about 4.5MB using Kodak's proprietary *lossless* compression scheme; lossless means that a minimum of visual data is discarded during compression.

The Photo CD process also can put previously developed 35mm slides and negatives—black-and-white and color—onto the same disc with your rolls of film.

ILLUSTRATION BY JEFF BRICE


KODAK SAFETY FILM 5077
(1:1 ASPECT RATIO)
RECTANGLE (4:3 ASPECT RAT
A
B
f
mm

Photofinishers, color labs, and professional image-processing services use Kodak's Photo CD Imaging Workstation to create Photo CDs. The system includes the Kodak PCD Film Scanner, which digitizes 35mm slides and negatives at a maximum resolution of 2048 lines by 3072 pixels at 12 bits per color channel (which is resampled down to 8 bits per channel); a Sun Microsystems SPARC workstation, which performs the color corrections and stores images in Photo CD–formatted image packs; and Kodak's PCD Writer, for recording those image packs onto compact discs. The system can automatically scan negatives and transparencies at high speeds or allow the operator to scan one image at a time for custom work.

One Photo CD can store 100 to 150 images (the amount varies; black-and-white photos, for example, contain less data than color images do, so a disc can hold more black-and-white than color photos). You don't have to put your images on disc all at once; you can add to the CD until it's full. However, you need a multisession CD-ROM drive to access those files added later to the disc. (Multisession drives read files that were written to the disc in more than one session.)

If you have Photo CD–compatible hardware and software, you can pop the CD into a player; view electronic thumbnails of the images; open an image file and save it as a TIFF, PICT, or EPS file on your hard drive; perform the kind of editing tasks—cropping, rotating, color correcting—that you would on any digitized image; then place the image in a page-layout, or other, program for output. Since you have five scans of each photo, you can use a low-resolution image for positioning and a higher-resolution scan for final output.

To process a roll of 24-exposure color film (and receive one set of prints) and transfer it to a Photo CD costs about $20—which is less than $1 per image.



Getting the Picture Kodak's Photo CD Access software mimics a traditional photographic contact sheet (top), providing an overview of all the images (displayed as thumbnails) on a Photo CD. Another way to obtain images with Photo CD Access is to click once on an image file name (bottom), preview the image (box at right in screen shot), then double-click on the file name to open the file.

The Real Story

WHILE MY EXPERIENCES with Photo CD aren't vastly different from what Kodak promises, I encountered some glitches worth mentioning.

I took one unprocessed roll of 24-exposure Kodak Ektar 25 color print film to a professional camera store on a Monday. The store didn't send the film to the Photo CD–finishing site until Wednesday. The disc came in the following Wednesday—a total of five working days, just as Kodak promises (but in reality, thanks to the camera store's delay, I had to wait a total of seven working days). The cost, including tax and a set of prints, was $30, or $1.25 per image—slightly more than expected, but this store caters to professional photographers and its prices are generally higher than those of the corner Fotomat franchise.

I made things complicated with my next venture. I went to a camera store in downtown San Francisco that caters to both amateurs and professionals and handed the manager two unprocessed rolls of film—Kodak Ektar 100 for color slides and Kodak T-MAX 400 for black-and-white prints—as well as some hand-picked, previously developed color and black-and-white negatives and color slides. I requested that everything be put onto one Photo CD.

The manager turned me over to the store's "Photo CD expert"; my request had the expert so perplexed that her eyebrows remained raised, like a drawbridge, during our entire conversation. She told me I couldn't put black-and-white film on a Photo CD; I convinced her I could. Finally, she placed each item into a separate envelope, wrote explicit instructions

Five Things You Can Do with Photo CD Now

1. Show vacation photos to friends on your TV set. By hooking up a Kodak Photo CD Player to a television monitor, you can display Photo CD images on screen.

2. Archive photographs on inexpensive CDs, which reduces the need to store images on SyQuest cartridges, optical drives, and other expensive storage media. Using an image-management program such as Kodak's Shoebox or Aldus's Fetch, you can locate images quickly by searching a database of thumbnails.

3. Create digital negatives. Should the original transparencies get lost or damaged, new ones can be made by printing the Photo CD images to a film recorder (with a slight loss of resolution). If you commission professional photography or use stock photos, ask the photographer to put the images on Photo CD. This process could provide some peace of mind, as you're frequently liable for hefty fees if you lose or damage the photographer's original negative or transparency.

4. Reduce your work load. Send your 35mm scanning jobs to a Photo CD supplier rather than having someone on staff do the job or sending the film to a service bureau, where a scan can cost $60 to $90.

5. Dazzle potential clients. Real estate agents, for example, can take photos of a property, have the film scanned onto a Photo CD disc, then import a picture into a page-layout program and print a fact-sheet, complete with a four-color photo.

on each envelope that everything was to be on one disc, then stapled all the envelopes together.

I picked up my disc ten working days later and everything was on it except the roll of black-and-white film. Fifteen working days after I dropped off the film, a second Photo CD containing the black-and-white images came in, accompanied by a note from the photofinisher explaining that the film had accidentally been exposed to light while in the camera (causing some photos to contain a few streaks and splotches of light).

During the process of manually scanning the various pieces of film onto disc, the photofinisher had decided to divert the black-and-white roll for more careful handling. Meanwhile, my other film was scanned onto a Photo CD. The photofinisher could have added the black-and-white images to the same disc, but that would be assuming that I had a multisession CD-ROM drive capable of reading images scanned in two sessions. As there aren't many multisession drives in use today, that would be a risky assumption (for more on multisession CD-ROM drives, see "Double-Speed CD-ROM Drives," in this issue). A better solution would have been to put everything on one disc at one time, even though I would have had to wait longer.

The cost of the first disc was $60 (including tax and prints) for 34 images—about $1.75 per image; the second was $20 for 14 exposures, or about $1.40 per image. The price for the first disc didn't surprise me; it's more expensive to have individual images scanned to disc than to have an entire roll of unprocessed film scanned to disc. That's because there's more labor involved; the photofinisher has to manually scan images one at a time rather than having the Kodak imaging workstation scan an entire roll.

I should point out that I experienced these problems in January 1993, only a few months after Kodak began rolling out Photo CD across the country. By the time you read this, photofinishers and camera stores will have had more experience with Photo CD. Also, an increasing number of high-quality service bureaus and image processing specialists are working with Photo CD. You'll pay more for their services than you would consumer photo outlets, but you'll generally receive faster, more reliable service.

Five Tips for Using Photo CD

1. Consider developing your film before putting the images on disc. You can't erase unwanted images once they're on the disc. Developing your film first and then choosing individual images prevents having unwanted images on your CD. However, you'll pay more per image, and you may wait a bit longer for your disc. You could also have the images you want from several discs copied onto one new disc for consolidation, but that will cost you more, too.

2. Pick your Photo CD drop-off location carefully. For best results, ask your colleagues for the names of the most reliable camera stores and photo developers in your area. Otherwise, you run the risk of encountering Photo CD "experts," as I did, who aren't familiar with the system, how it works, and what you can expect from it.

3. Find out where you can get the fastest service. If you want to use Photo CD images and you are facing a tight deadline, call Kodak's toll-free number (800/242-2424, ext. 36) and ask for the name of the closest photofinisher with an on-site Kodak Photo CD Imaging Workstation. These sites can give you speedy service—one or two working days, depending on your order, compared with the five- to seven-day service you will get elsewhere. If no photofinisher is in your immediate area and you are in a rush, consider sending your film via overnight mail to the closest location.

4. Experiment before you invest. If you already own a CD-ROM drive and you're not convinced of Photo CD's merits, buy a software utility such as the CD-ROM ToolKit ($79) from FWB that will enable your drive to read single-session Photo CD files. You'll have to save up a whole disc's worth of photos before ordering (or waste a lot of disc space getting a new CD-ROM whenever you get film processed), but you'll get an idea of what Photo CD can do for you, before spending $600 to $800 on a multisession CD-ROM drive.

5. Upgrade your computer's memory and hard drive space. If you decide to take the Photo CD plunge, you're going to need as much storage and memory as you can possibly afford and/or install, particularly if you plan to view and edit the larger Photo CD files. You can open an 18MB Photo CD poster-size file on a Mac with, say, only 8MB of available RAM using an application (such as Adobe Photoshop) that supports virtual memory. Be forewarned, however: opening a large graphics file with virtual memory is a tiresome, slow process, since virtual memory uses hard drive space. If you plan to open large files regularly, it's time to add more RAM.

What You Need: Hardware

ONCE YOU'VE GOT YOUR PHOTO CD, you won't be able to comfortably view or edit any of the images on a Macintosh unless you have, at a *minimum*, the following hardware:

- A Macintosh running System 6.0.5 or higher, a 68030 processor, 8MB of RAM (16MB or more is best for viewing higher-resolution files), and at least a 14-inch color display.
- 16-bit color. For optimal viewing, your Mac should be capable of displaying millions of colors (24-bit mode), but 32,768 colors (16-bit mode) is the minimum for professional use.
- A multisession CD-ROM XA Mode 2 drive. This new breed of CD-ROM player is just now becoming widely available; Apple's internal CD 300i drive in the Macintosh IIvx was one of the first. A multisession drive gives you the flexibility to add images to your Photo CDs. Upgrading a CD-ROM drive from single session to multisession requires hardware and software; at press time, only a few vendors, such as NEC Technologies and Toshiba, were offering multisession hardware-and-software upgrades to their CD-ROM drives. Otherwise you can get by with a single-session CD-ROM drive if you don't plan to add images to a disc. For more information, see "Five Tips for Using Photo CD."
- A graphics accelerator board is optional but recommended. Unless you have a souped-up Mac IIfx or Quadra, opening the larger Photo CD images can be an endurance test—the poster-size images can take 15 minutes or longer to materialize on screen, depending on your Mac. Several graphics accelerators, such as SuperMac's Thunder II ($4999), now ship with Kodak's Photo CD Access soft-



Organizing Your Images Kodak's Shoebox image-management program enables you to catalog thousands of Photo CD graphics—as well as images in other file formats—and to find them by typing in key descriptive phrases.

ware ($39.95), which lets you open Photo CD files and export them in TIFF, PICT, or EPS format.

What You Need: Software

THE PHOTO CD IMAGE FORMAT USES Kodak's proprietary PhotoYCC color-encoding scheme, which enables you to view the images on Macs, PCs, and even high-definition television (HDTV) sets. PhotoYCC isn't widely supported yet. Among the programs that can, or soon will be able to, directly import Photo CD files are Aldus PageMaker 5.0, Fractal Design Painter 2.0, and Adobe Photoshop 2.5. Photoshop 2.0 users can use the Photo CD plug-in module from Adobe, available at no charge via AppleLink, America Online, and CompuServe. Kodak's Photo CD Acquire module for Adobe Photoshop ($59.95), a Photoshop plug-in, enables you to manipulate an image's color balance, saturation, or brightness in the native PhotoYCC format, preserving color data.

With an AppleCD 300 (external) or CD 300i (internal) CD-ROM drive and QuickTime 1.5, you can view Photo CD files as thumbnails or in a small QuickTime window via the Apple Photo Access system extension, which ships with Apple's drive (a few other drive manufacturers also include this software). TeachText 7.1 (part of System 7.1) lets you open the lower-resolution images and save them as PICT files. TeachText can't handle the large and poster-size Photo CD files, though; for those you need Photoshop or another Photo CD–compatible program.

Kodak has released several software packages, such as Photo CD Access (mentioned earlier), that directly import Photo CD files. Photo CD Access, a minimalist tool, lets you view the contents of a disc as an electronic contact sheet. PhotoEdge ($139) gives you those capabilities, plus some minor image-editing features. Kodak Renaissance ($695) is a page-layout program with some drawing tools (see *Reviews*, *Macworld*, December 1992).





Compare the image from a Photo CD (left) with the image scanned at the same resolution and dimensions on a $20,000 Barneyscan CIS 4520 RS film scanner (right). The Photo CD image's color and detail depth closely resemble the original 35mm slide; it was color corrected automatically by the photofinisher. The Barneyscan image, which we color-corrected in Adobe Photoshop, still appears slightly washed out in comparison to the Photo CD scan.

Photo CD: A Shopping List

To fully exploit Kodak's Photo CD system, you need a multisession CD-ROM XA Mode 2 drive. You'll also need software that can read Photo CD–formatted files, or a Photo CD player to view pictures on your TV set. See "Double-Speed CD-ROM Drives," in this issue, for contact information and lab results on multisession drives. Here's a shopping list of other Photo CD–compatible hardware and software to get you started.

- **PhotoSpeed,** SuperMac Technology (408/773-4498, 800/334-3005; $3999). This product includes everything you need: a bunch of useful software including Kodak PhotoEdge, Storm Technology's Picture Press, QuickTime 1.5, and HSC Software's Kai's Power Tools; and hardware—the Spectrum 24 Series 4 (a SuperMac 24-bit color QuickDraw acceleration board), stock-photo CD-ROMs, and a Toshiba 3401 double-speed, multisession CD-ROM player. **PhotoSpeed Pro** ($4999) replaces the Spectrum 24 with a faster QuickDraw accelerator (SuperMac's Thunder II Light) and also includes Adobe Photoshop 2.5.
- **CD-ROM ToolKit,** FWB (415/474-8055; $79). **CD-ROM Driver for Macintosh**, Trantor Systems (510/770-1400, 800/872-6867; $99). **SuperCache**, Optical Access International (617/937-3910; $99). These software utilities are among those that upgrade a CD-ROM drive to single-session Photo CD. You should check with these vendors before buying, though; not all CD-ROM drives can be upgraded.

Photo CD Players

- **Model PCD 270** ($379), an entry-level machine; the mid-range **Model PCD 870** ($449); and the high-end **Model PCD 5870** ($549)—all from Kodak (716/724-4000, 800/846-2200). The Model PCD 5870 can accommodate five discs at a time. These players hook up directly to a TV or stereo/TV system and can play consumer audio CDs as well (they can't be hooked up to a computer, though).
- **PowerCD** from Apple (price not available at press time). Apple's portable multisession drive functions as a single-speed desktop CD-ROM player and can be hooked up to a TV for Photo CD image playback or to a stereo system, as a standard compact disc player.
- **3DO Interactive Multiplayer**, developed by The 3DO Company. You will be able to view Photo CD images—including panning them from left to right and zooming in on areas—with this stand-alone CD-ROM player, which connects directly to a TV. Vendors such as Panasonic plan to begin selling the player this fall; the price is expected to be around $700.

Photo CD–Compatible Software

- **Adobe Photoshop 2.5**, Adobe Systems (415/961-4400, 800/833-6687; $895). Photoshop 2.5 opens Photo CD files directly. Kodak sells a Photoshop plug-in module, **Photo CD Acquire Module for Adobe Photoshop** ($59.95).
- **Aldus Fetch 1.0** ($295) and **Aldus PageMaker 5.0** ($895), Aldus Corporation (206/628-2320). Fetch, an image-management program, opens Photo CD files. Aldus says the forthcoming PageMaker 5.0 will open Photo CD files using a filter.
- **Painter 2.0**, Fractal Design (408/688-8800; $399). This 24-bit paint program has image-editing tools.
- **Kodak Photo CD Access** ($39.95), **PhotoEdge** ($139), **Renaissance** ($695), and **Shoebox** ($395), Kodak (716/724-4000, 800/242-2424). All read Photo CD files.

Kodak Shoebox ($395), an image-management application, enables you to create and update a visual database of all your graphics files—everything from QuickTime movies to Photo CD images to clip art. The image-management arena is new and red-hot: Aldus's Fetch ($295), Nikon's Image Access ($495), and Imspace Systems Kudo Image Browser ($295) are just a few Shoebox competitors (see "Photo CD: A Shopping List").

What You Get

SO HOW DO THE PHOTO CD IMAGES look on screen? I'm impressed, and everyone else I talked with (including service bureau owners, desktop publishers, and designers at *Macworld*) was, too. Photo CD files go a long way toward capturing the full breadth of detail and color saturation of the original images. The output quality from a Photo CD file won't be as high as that of a print made from the original transparency, but that's a fact of life in the desktop world. Also, Kodak's compression scheme creates some loss of data, but overall the loss is slight. (Other compression techniques, such as TIFF's LZ10, sacrifice no visual information.)

Screen images are one thing; printing those images can be another. For comparative purposes, Martha Katt, *Macworld* design associate, scanned an original color transparency on a Barneyscan CIS 4520 RS 35mm film scanner—a $20,000 machine—at the same dimensions (512 lines by 768 pixels) as the standard-size Photo CD–formatted image. Then she sent the Barneyscan-generated file and the same image in Photo CD standard-size (converted into TIFF format) to a service bureau for Matchprints (color proofs).

The result was a pleasant surprise. The colors in the Photo CD Matchprint are more faithful to the original than the colors in the Barneyscan version, and the details more noticeable (see "Putting Photo CD to the Test"). The Photo CD image still needed a bit of color correcting in Photoshop, but most scans do, and the amount it required was minimal.

Printing a low-resolution color Photo CD–formatted file stored on the CD on a ColorScript 100 model 30si printer took slightly longer than outputting the same image saved as a TIFF file on an internal hard drive. That's because a CD-ROM transfers data to the Mac at a much slower rate than a hard drive does. But I saw no discernible difference in print quality.

What's Next

KODAK PLANS TO OFFER MORE PHOTO CD formats by mid-1993. The Pro Photo CD Master system will support professional film formats such as 70mm and 4-by-5-inch transparencies. Kodak Photo CD Portfolio will let you combine sound, text, and related graphics (but not video) with up to 800 low-resolution Photo CD images on one CD-ROM. Artists can put their best work on disc accompanied by their own audio commentaries; schools can create their own interactive Photo CD yearbooks; and so on.

By this fall, Kodak will ship authoring software that enables you to master your own Photo CD Portfolio discs using Kodak's PCD Writer 200 recordable CD-ROM drive. The drive is now available for $5995; at press time, no price was set for the Mac authoring software. In addition, Kodak will make the Portfolio application programming interface (API) available to third-party software vendors. Once vendors incorporate the API into their programs, you'll be able to create a multimedia presentation in the application of your choice for publishing on a Portfolio-formatted Photo CD.

And with Kodak's Picture Exchange, an electronic bulletin board service set to debut in mid-1993, you'll be able to search online for particular images from a variety of photo agencies and suppliers, view thumbnails of those images, and order original transparencies and prints for overnight delivery.

The Big Question

SO IS PHOTO CD A VIABLE TECHNOLOGY, or is it just marketing voodoo? From my experiences, Photo CD lives up to its promises, even with the few kinks I found in the system.

There's one potential stumbling block to Photo CD, however: most computer users still don't own CD-ROM drives. But Kodak has several reasons to hope this situation will change, and soon. The benefits of Photo CD as it exists now, as well as the promising capabilities Kodak plans to add, should lure many into buying CD-ROM drives. Apple recently validated CD-ROM technology by offering an optional, internal CD-ROM player in the Macintosh IIvx, Performa 600, and Centris computers. And the emergence of ever-faster drives should be another draw.

Photo CD isn't going to completely replace scanners, particularly the high-end models.

But it's an attractive, inexpensive way to view and archive photos, whether you simply want to catalog family pictures and watch them on television or create a slick advertising brochure. At the very least, a Photo CD could make the life of a desktop publisher a little less hectic—and that's worth the price of a CD-ROM drive alone. **m**

How Does Photo CD Stack Up Against the Competition?

Photo CD is just one method of digitizing photographs for use with your Mac. Here's a look at how the advantages and disadvantages of Photo CD compare to other imaging technologies.

- **Photo CD.** *Advantages:* Image scans are inexpensive and of high quality. The storage medium is inexpensive and enables you to create digital negatives. *Disadvantages:* You need to invest in Photo CD–compatible hardware and software. The Photo CD format is confined (for now) to scanning only 35mm film. You have to wait several days to get your disc. The Photo CD–image file format is nonstandard.
- **Scanners.** *Advantages:* You can digitize images on demand. Some models scan reflective artwork as well as 35mm slides and negatives. Scanning in-house is a better option for confidential materials. 24-bit color scanners have become inexpensive (many models are under $2000) but offer only 300- or 600-dpi resolution. *Disadvantages:* Digitizing a photo at the same top resolution as Photo CD—2048 lines by 3072 pixels (12 bits per color channel)—requires a 35mm film scanner in the $11,000-and-up price range. Photo CD–equivalent scanning jobs require a fast computer with large amounts of memory and storage.
- **Digital cameras.** *Advantages:* Cameras provide instant digital images. There's a variety of camera models from which to choose. *Disadvantages:* High-resolution cameras can be expensive (Leaf Systems' Leaf Digital Camera Back, for example, offers 2048-by-2048-pixel resolution and costs $29,000). Many models store images on a camera's internal hard drive, the weight of which restricts mobility and can quickly drain battery power. Lightweight still-video cameras cost less ($1500 to $3000) but offer low resolution.
- **Service bureaus.** *Advantages:* Sending slides or negatives to a service bureau frees up staff for other tasks; the bureau scans the image as well as provides color corrections, separations, and proofs, and you can specify image size and resolution. *Disadvantages:* Large graphic files require lots of storage capacity on expensive media (SyQuest drives, for example). The cost per image is high (often up to $90), although that could be changing: last winter, in response to Photo CD, the electronic color prepress service bureau CyberChrome, in Branford, Connecticut, dropped its per-image scanning-separation-proof charge from a range of $50 to $75, down to $12.



NEC MultiSpin 38 (top), AppleCD 300 (middle), and Pioneer DRM-604X (bottom)

The latest drives are the fastest yet. Macworld Lab tests nine new CD-ROM mechanisms.

Double-Speed CD-ROM DRIVES

BY JAMES A. MARTIN

NO DOUBT ABOUT IT—CD-ROM IS HOT right now. Multimedia discs for the Mac are coming out at a fast pace, and Eastman Kodak's Photo CD format—offering inexpensive, high-quality scans of 35mm photography stored on disc—is giving longtime CD-ROM holdouts another reason to consider buying their first drive.

The growing interest in multimedia and Photo CD has spawned a new generation of CD-ROM drives with double-speed transfer rates, which are designed to increase the playback rate for video and animation by sending more data per second, which results in smoother motion and clearer images. These new CD-ROM drives also offer multisession CD-ROM XA Mode 2 support (which is needed for full Photo CD capability). (For more on Kodak's new image format, see "Hands-On: Photo CD," in this issue.)

With prices as low as $465 for CD-ROM drives using these new mechanisms, and several such models available for $599, it seems to be the perfect time to buy. (The table "Who Offers Double-Speed Drives" lists what vendors offer which mechanisms.) But before you write that check, consider two caveats:

- **Limited speedup for animation** Despite the fact that the new drives double their transfer rates (from 150 kilobytes per second to 300–330 KBps), you won't see a significant improvement in a QuickTime video or other animation.
- **Faster drives are coming** By this time next year, it's a good bet that CD-ROM drives with even faster transfer rates will be available for around the same prices as today's models.

This isn't to suggest that you should steer clear of the current crop of double-speed CD-ROM drives. Indeed, most of the new drive mechanisms performed well in Macworld Lab tests. Nonetheless, it's important to separate hype from reality and ask yourself if now is really the time to buy and, if so, which drive best suits your needs. Our lab tests were designed to help you with the latter question; when to buy is up to you.

Rating Transfer Rates

TO ACHIEVE THE DOUBLE-SPEED TRANSfer rate, drive manufacturers needed speedier spindle motors. In addition, the drive's controller software and error-correction logic had to be reprogrammed to accommodate the increased flow of data.

Most manufacturers agree that upgrading drive mechanisms to handle double speed is a fairly straightforward pro-

WILLIAM ZEMANEK

cess. The biggest challenge is in building mechanisms capable of faster speeds while still maintaining the same half-height CD-ROM form factor that most single-speed drives have.

But not all mechanism makers followed this same-size goal. Pioneer, for example, designed its new CD-changer mechanism (which can accommodate six CDs at a time), the DRM-604X, to offer a "QuadraSpin" transfer rate of 600 KBps. To provide that speed, the mechanism is roughly twice the size of other CD-ROM mechanisms. That extra space is needed for the larger motor and other components.

To test transfer rates, we viewed QuickTime movies and watched for jerky motion and missing audio. The faster the transfer rate, the smoother the video. Why? Because to transfer the video and audio to the Mac's processor in sync with the movie's playback rate, QuickTime skips frames and drops audio when necessary. Among the mechanisms we tested, the Pioneer's data-transfer rate was by far the fastest, followed by the Sony and Toshiba mechanisms (see "Are Double-Speed Drives Really Twice as Fast?" for complete results).

Our tests reflect some improvement in video playback on the double-speed mechanisms compared with single-speed drives; overall, QuickTime clips ran a bit more smoothly, with less audio dropout. But again, the improvement is not significant—there's certainly not a twofold increase in QuickTime performance with double-speed drives. In fact, a QuickTime movie played on the Pioneer 600-KBps mechanism looks much the same as it does when played on drives with 300-KBps mechanisms.

The reason is that current multimedia titles have QuickTime video that's optimized to play on 150-KBps drives. Those drives, after all, have been the standard for years and represent the lion's share of CD-ROM drives sold. Once CD developers create new titles, or revise existing ones, with video optimized to run on 300-KBps drives, your investment in a double-speed drive for multimedia viewing will really pay off. The faster transfer rate, for example, will enable QuickTime developers to sustain more frames per second in their video, which will result in more fluid video motion.

But it's anyone's guess as to when such titles will be available. An informal query of CD developers and publishers (Warner New Media, The Voyager Company, Brøderbund, and others) found that none had any immediate plans to take advantage of double-speed drives. "We develop for the lowest common denominator," explained one developer, "and for a while, at least, 150 KBps is still going to be that denominator."

Grabbing Graphics Files

ALTHOUGH DOUBLE-SPEED DRIVES can't really show their stuff yet with QuickTime, their faster speeds are quite noticeable with large graphics files.

In a test designed to measure transfer rate, we opened a 1.4MB Adobe Photoshop 2.0 file from the Apple Color Graphics Sampler CD, which comes with Apple's drive. The Pioneer mechanism was the fastest again, taking just 5.8 seconds; the Sony CDU-8003 mechanism, used in Apple's AppleCD 300 drive, was second, followed by the Chinon CDA-535 and NEC 38 mechanisms.

Assessing Access Speeds

CD-ROM DRIVE MANUFACTURERS HAVE not focused their efforts entirely on speeding up transfer rates. Access speed (how long it takes the drive to find a piece of requested information) has also been improved in most mechanisms. Access speed is measured in milliseconds (ms) and is an important performance criterion for those who regularly search large CD-based databases (dictionaries, encyclopedias, and so on).

In our tests designed specifically to measure access speeds, we performed a keyword search on Quanta Press's World War II historical CD (see the "Search Database" column in the bar graph below). The speediest mechanisms were also those that delivered the fastest transfer rates: the Pioneer DRM-604X was tops, performing the search in 13.8 seconds, followed by the Sony CDU-8003 mechanism in Apple's drive, and the Chinon CDA-535. The slowest was, not surprisingly, the Toshiba XM-3301TA single-speed mechanism we used for comparison. We picked the Toshiba mechanism because, of the mechanisms used by multiple vendors in their single-speed CD-ROM drives, it is the fastest, according to Macworld Lab tests.

Consider Other Factors

SPEED IS CERTAINLY ONE OF THE MOST important factors to consider when choosing a CD-ROM drive. But there are others to weigh as well:

MW LAB Are Double-Speed Drives Really Twice as Fast?

Double-speed CD-ROM drives do play back data at twice the rate of a standard CD-ROM drive (300 KBps compared with 150 KBps), but this doubled rate does not hold up for real-world tasks. For example, a double-speed drive plays video about 1.5 times as fast as a standard drive. For search and retrieve, a double-speed drive is about 1.2 times as fast. Overall a double-speed drive is only about 1.4 times as fast as a regular drive. System and drive overhead keep the overall speedup lower than the doubled transfer rate would otherwise indicate.

= Fastest result for each test
= Single-speed drive used for comparison

Products are in order of overall performance with the best at the top.

PLAYBACK

These tests show how well each drive handles sustained access needed for continuous playback. **Speeds are in KBps.**

SEARCH AND RETRIEVE

These tests show how well each drive does in finding data on a CD and then transferring it to the Mac. Focus on these results if your intended use is data archiving and CD-based publishing. For continuous data playback (like animated presentations and movies) use the results under "Playback." **Times are in seconds.**

OVERALL

Times as fast as standard (150-KBps) CD-ROM drive, based on all tests.

	Data Rate	Video Rate	Search Database	Retrieve Graphics File	Read Interactive CD	Ranking
Pioneer DRM-604X	600.3	314.7	13.8	5.8	49.7	2.1
Chinon CDA-535	300.0	482.3	24.3	7.7	55.6	1.7
Sony CDU-8003	329.3	235.7	23.4	7.4	56.9	1.5
Sony CDU-561	300.0	231.0	27.2	8.2	57.1	1.4
Texel DM-5024	299.3	223.3	29.7	7.9	58.7	1.4
Toshiba XM-3401TA	329.0	206.0	28.7	9.1	57.9	1.3
NEC 38	300.0	180.3	29.9	7.7	58.8	1.3
NEC 84-1	293.0	161.3	31.4	10.1	57.1	1.2
Toshiba XM-3301TA	149.7	161.0	32.9	12.3	67.1	1.0

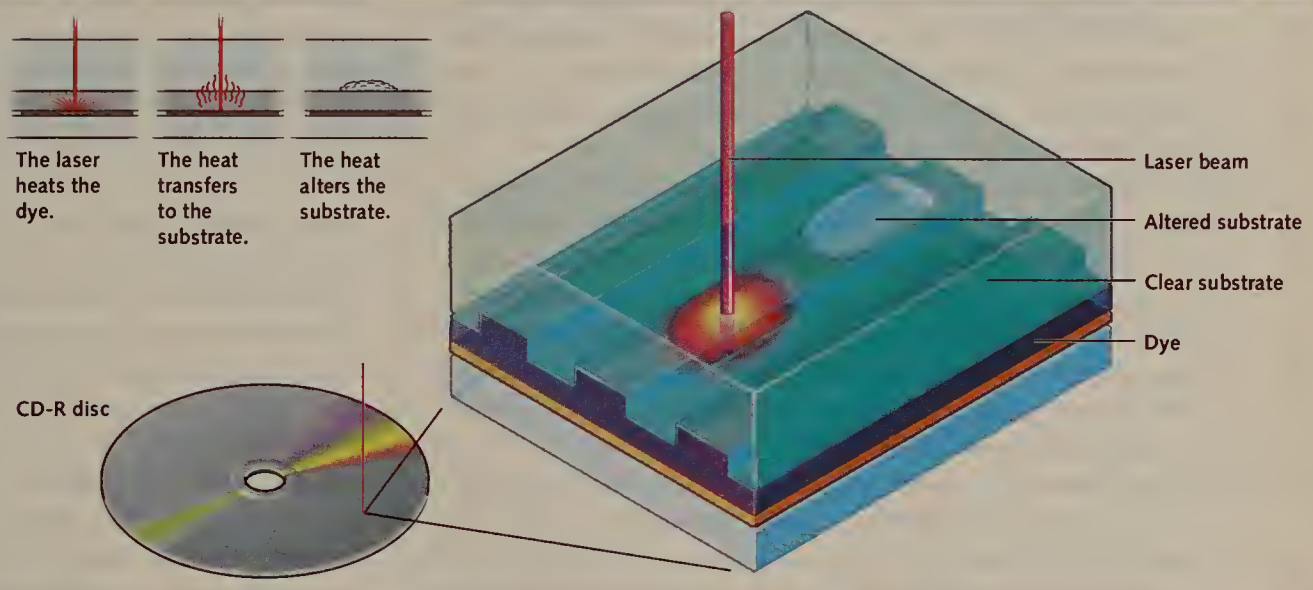
Recordable CDs: Affordable Do-It-Yourself Discs

by Jim Feeley

Four years ago, you needed a roomful of equipment, two expert technicians, and eight hours to produce a single CD. Today, you can make a disc in an hour using a Mac with a CD-recordable (CD-R) drive costing as little as $4000. CD-R is a write-once optical storage technology suitable for archiving data, prototyping CDs before conventional production, and final production of titles with runs under 50. (Kodak's Photo CD system is built around CD-R, for example.) Several Mac CD-R drives are now available for under $9000, and blank CD-R discs have dropped in price to about $30. These prices convinced MCI, the telecommunications company, to offer billing records to large customers on CD-R discs.

HOW CD-R DRIVES RECORD

All CDs have patterns of reflective and nonreflective areas to encode and store data. To get those patterns on a CD-R disc, a powerful laser heats a spot in a layer of dye. The dye then transmits heat to the adjacent area of the substrate; the heated area becomes altered so it disperses light. In areas left untouched by the laser the substrate remains clear and allows the laser light that reflects off the metal layer through, so it bounces back to be read by the drive's light sensor.

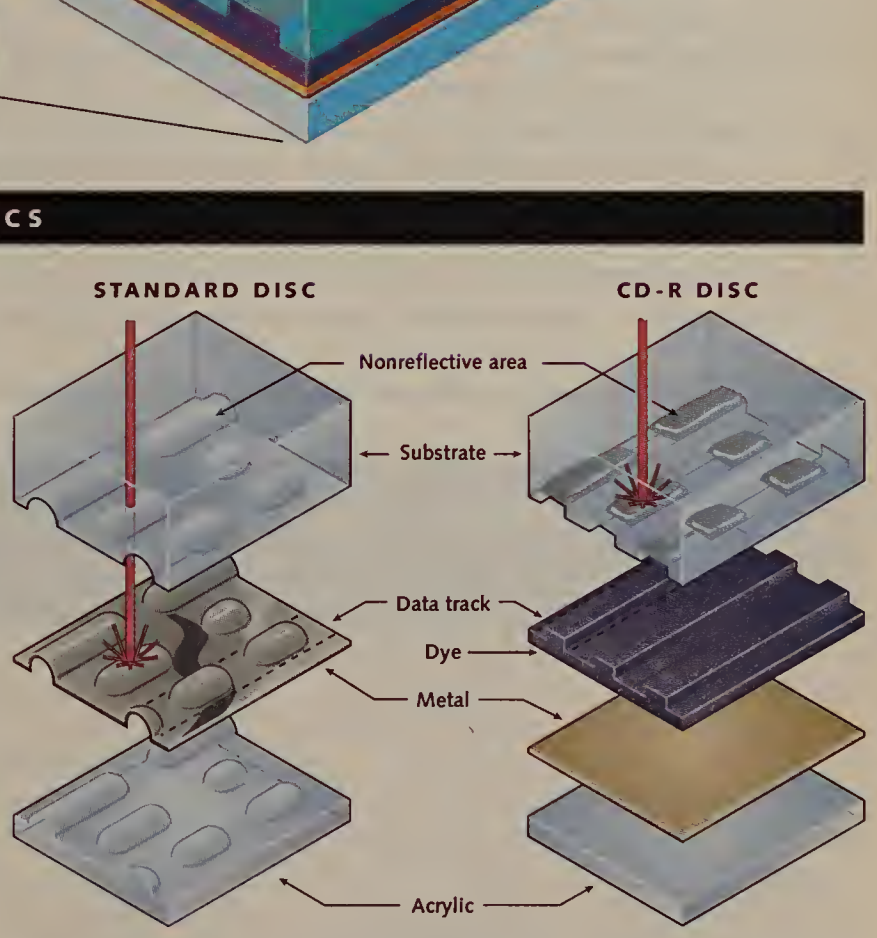


WHY ANY CD-ROM DRIVE CAN READ CD-R DISCS

Although the techniques for recording information on standard CDs and CD-R discs are different, the result is the same: a pattern of reflective and nonreflective areas that any CD-ROM drive can read. To read a disc, a drive aims a low-power laser beam at the disc and uses a light sensor to monitor the pattern of reflected light.

How CD-R and CD-ROM Discs Are Alike All CDs store data along an extremely narrow (1/100 the thickness of a human hair) spiral track that, if uncoiled, would be 3 miles long. All CDs have a clear polycarbonate substrate layer that makes the disc rigid (and keeps scratches on the surface of the disc out of the laser beam's focal plane), a layer of metal that reflects the laser beam, and an acrylic layer (on which the label is imprinted) that protects the metal layer.

How CD-R and CD-ROM Discs Differ On standard CDs, the substrate material is injected into a mold, resulting in reflective flat areas (called lands) and nonreflective indented areas (called pits). On a CD-R disc, some areas of the substrate are altered (making them nonreflective) by a high-power laser that heats the adjacent dye layer. Standard CDs use aluminum as the material off which the laser beam reflects, but a CD-R disc uses gold, since aluminum would not reflect enough light back through the dye layer for the CD-ROM drive's light sensor to pick up.



CD-R PROS AND CONS

CD-R offers some clear advantages over traditional cartridge write-once, read-many (WORM) and magneto-optical (MO) drives. You don't need an expensive drive to gain access to your data. Any CD-ROM drive can read CD-R discs (but as with Photo CD, you need a multisession drive to read multisession discs). Unlike MO cartridges, CD-Rs can't be accidentally erased. And CD-R storage costs about 5 cents per megabyte, while MO storage costs start at 17 cents per megabyte.

But a CD-R drive isn't for everyone. If you only need to produce an occasional CD, it's still cheaper to have a service bureau press a single disc for $200 to $300. To create your own discs, you need at least a Mac IIci with a fast 600MB hard drive. You must feed data to CD-R drives in a continuous stream; any break in the data flow makes the disc's data unusable. Currently, to archive data from a network server, the contents must first be dumped to a local drive, then sent to the CD-R from that local drive, ensuring a continuous stream while writing data.

Meridian Data and Kodak are working on a product that will allow a CD-R drive to back up a busy network without needing an additional hard drive as an intermediary. Pinnacle Micro also hopes to improve network backup and access to its CD-R drive.

WHERE TO BUY CD-R DRIVES

If you want to record your own CDs on your own drive, the following Mac CD-R drives are available now from several vendors:

- Eastman Kodak (800/242-2424). The Kodak PCD Writer 200 ($5995 for the drive plus $2000 for the Mac software) can record at 300 KBps and supports audio, Apple HFS, and ISO 9660 formats.
- JVC Information Systems (714/965-2610). The Personal Archiver ($4100 internal, $4595 external) records in Apple HFS or ISO 9660 formats or in a unique dual mode that allows the same 580MB disc to be mounted as an HFS volume on Macs and as an ISO 9660 volume on DOS and Unix machines. JVC's Personal ROMMaker ($9995) adds a 680MB hard drive, optional digital audiotape (DAT) output, and premastering software to the drive. JVC hopes to have multisession recording software available by the time you read this.
- Philips Consumer Electronics (615/475-8869). The CDD 521 MR ($8000) can record at 300 KBps and supports CD-Audio, ISO 9660, and Apple HFS formats. It can record multiple sessions. Recording software for Microsoft Windows is also available.
- Pinnacle Micro (714/727-3300). The RCD 202 ($3995) records discs in audio, ISO 9660, or Apple HFS formats. It can also support data and audio on the same disc. Multisession writing is promised in future versions.

Understanding Transfer Rates

Transfer rate measures the speed at which a CD-ROM drive moves data from the disc into the Mac's processor. This speed is most important when viewing multimedia titles (which contain large QuickTime or animation files) and 24-bit color, high-resolution graphic files (such as some Photo CD images).

Why transfer rate is important Due to the large size of graphics files, a fast sustained transfer rate is needed to send all that data from the drive through to the computer as efficiently as possible. The faster the transfer rate, in theory, the smoother the video and audio playback, and the less time spent waiting for an image to appear on screen.

Faster is still relatively slow When CD-ROM drives were first released in the mid-1980s, their transfer rates averaged about 150 kilobytes per second (KBps)—a speed that didn't change until NEC released its InterSect 74 CD-ROM for the Mac in early 1992 (now supplanted by the MultiSpin 74), with transfer rates averaging 300 KBps. (By comparison, most hard drives can transfer data at about 1MB to 2MB per second.) As for all types of drives, the actual transfer rate depends on the type and amount of data.

Advantages of buffers To help increase transfer rates, most drive manufacturers offer a data buffer (or cache), an internal storage area that helps smooth the flow of data during the transfer process. The majority of single-speed drives have 64K data buffers, but several mechanism manufacturers (Sony, NEC, and Toshiba among them) have upped that to 256K with the new double-speed drives.

How audio is different Transfer rates for audio, unlike those for video and graphics, remain at 150 KBps on double-speed drives, because increasing the audio-speed standard would result in chipmunklike voices. As a result, double-speed drives must perform at dual speeds—150 KBps for audio and 300 KBps for video and graphics, constantly shifting back and forth between the two speeds.

The Mac's not usually the bottleneck In most cases, CD-ROM transfer rates are not significantly affected by the processing power of your Macintosh. The SCSI bus on a 68000-based compact Mac like a Classic, for example, has a maximum sustained data-transfer rate of up to 1MB per second. When playing a CD title on a drive capable of only 300 KBps, a Classic is hardly going to create a bottleneck. However, it is possible that the Mac could be a bottleneck for two types of CD titles—occasionally for QuickTime movies and often for Photo CD images:

- QuickTime uses the Mac's processor to decompress a movie as it's transferred from the CD-ROM drive, so you might notice some difference between a Classic and a Quadra when playing a QuickTime movie. But QuickTime was designed to play synchronized video on all Macs regardless of processing power, so that difference is minimal.
- Unlike with QuickTime, how quickly (or slowly) your CD-ROM drive can transfer Photo CD files to the processor varies, depending upon your Mac's processing power. Kodak's Photo CD format uses a proprietary compression scheme for the two highest Photo CD resolutions (each Photo CD image is available in five resolutions). The Mac's processor is responsible for decompressing the images so it can display them on screen. Naturally, the faster the processor, the faster the decompression.

WHO OFFERS DOUBLE-SPEED DRIVES

	Product Name	Mechanism Used	List Price	Driver Used	SCSI Pass-through	Money-Back Guarantee	Free Tech-Support Period
Apple Computer	AppleCD 300	Sony CDU-8003	$599 *	Apple CD Setup 4.0 2	yes	none	unlimited
CD Technology	CD Porta-Drive	Toshiba XM-3401TA	$850	OMI 1.6	yes	30 days	12 months
Chinon America	CDA-535	Chinon CDA-535	$795	Chinon	yes	none **	unlimited
FWB	HammerCD	Toshiba XM-3401TA	$959	FWB CD-ROM ToolKit 1.0	yes	none	unlimited
Hard Drives International	PowerDrive	Texel DM-5024	$549	Trantor	yes	30 days	unlimited
Liberty Systems	115 Series CD	Toshiba XM-3401TA	$699	FWB CD-ROM ToolKit 1.0	yes	30 days	12 months
MacProducts USA	Magic CD-ROM	Toshiba XM-3401TA	$599	Nubis 1.02	yes	30 days	unlimited
Micronet Technology	Micro/CD ROM	Toshiba XM-3401TA	$995	Toshiba	yes	none	unlimited
Mirror Technologies	CD-ROM Drive	Toshiba XM-3401TA	$679	Mirror CD 3.05	yes	30 days	unlimited
NEC Technologies	MultiSpin 74	NEC 84-1	$615	Trantor 3.01	yes	none **	unlimited
	MultiSpin 38	NEC 38	$465	Trantor 3.01	yes	none **	unlimited
Optical Access International	Allegro II	Toshiba XM-3401TA	$679	SuperCache 2.2.3	yes	30 days	unlimited
	Performer II	Matsushita CR-533	$499	SuperCache 2.2.3	yes	30 days	unlimited
	Turbo 6 Pak	Pioneer DRM-604X ***	$1795	SuperCache 1.5.1	yes	30 days	unlimited
Philips	CH425ABK	Shinano Kenshi	$699	Trantor/Adaptec	yes	none	12 months
Pioneer	DRM-604X	Pioneer DRM-604X ***	$1795	Pioneer	yes	none	unlimited
PLI	CD ROM M8200	Toshiba XM-3401TA	$969	OMI 1.6	yes	30 days	unlimited
Procom Technology	Mac CD/MX	Toshiba XM-3401TA	$795	Procom	yes	none	unlimited
	Mac CD Station II	Toshiba XM-3401TA	$995	Procom	yes	none	unlimited
Relax Technology	Toshiba	Toshiba XM-3401TA	$599	Trantor	yes	30 days	unlimited
	Pioneer	Pioneer DRM-604X ***	$1299	Trantor	yes	30 days	unlimited
	Texel	Texel DM-5024	$549	Trantor	yes	30 days	unlimited
Sony	CDU-561	Sony CDU-561	$649	Trantor 3.05	no	none **	unlimited
Texel	DM-5024	Texel DM-5024	$599	Trantor 3.05	yes	none	unlimited
Toshiba America Information Systems	TXM-3401E1-Mac	Toshiba XM-3401TA	$1010	Toshiba	yes	none	unlimited

** $499 internal version to be available in July. ** Dealers may offer their own money-back guarantees. *** Has 600-KBps transfer rate.*

• **Multisession Photo CD support** If you have a roll of film scanned onto a Photo CD, you'll be able to view those files (provided you have the right software) on many different single-speed, single-session drives. But should you add another roll of film to that disc later, only a multisession drive will be able to read those added photographic images.

In most cases, those multisession drives are also double-speed drives. There's no relationship between double-speed and multisession, however, other than the fact that most drive-mechanism manufacturers added multisession capability at the same time that they increased the drive's speed.

• **Bundles** Increasingly, CD-ROM drive vendors are including choice CD titles with the deal; some vendors even include a pair of stereo speakers or other lagniappes. Apple's CD bundle, for example, is extremely generous, offering among its titles the book-and-CD combo From Alice to Ocean as well as several demo discs, at no extra charge. Most vendors do charge extra for their bundles, though, so be sure to ask.

• **Physical characteristics** CD-ROM drives, for the most part, look a lot like external hard drives: boxy and nondescript. There are some exceptions, though. The Sony-based drives are sleek and slender; the drives based on Pioneer's DRM-604X CD-changer mechanism are big and bulky; and NEC's MultiSpin 38 is lightweight and portable. Chinon's drive was the most unappealing of the bunch, with its awkward external power supply.

All the drives (except the portable MultiSpin 38) we looked at have a covering over the disc-insertion slot to keep out that old devil: dust. NEC's MultiSpin 74 model gets top honors here, with its double dust-door covering. Also, the MultiSpin 74 comes with external attachments that let you stand it on its side, an advantage in cramped desktop situations. Other vendors should follow suit.

• **Ease of use** Adding a CD-ROM drive to your Mac is pretty straightforward (or as straightforward as adding a SCSI device gets). For those who are new to the process, it may be heartening to know that many drive vendors now offer unlimited technical support. And among the manuals I perused, Apple's was the most complete—the only one to explain Photo CD and how to access files in that format. Other vendors should follow suit.

Most vendors also know that SCSI termination should be external or switchable so you can easily put your CD-ROM drive anywhere on the SCSI chain you need to. Only NEC's MultiSpin 74 and drives based on Sony's CDU-561 mechanism still use hard-to-reach internal termination, forcing you to put the drive at the end of your SCSI chain.

Customer Contact Number : Toll	Customer Contact Number: Toll-Free
408/996-1010	800/767-2775
408/752-8500	none
310/533-0274	800/441-0222
415/474-8055	none
602/902-1176	800/927-7848
408/983-1127	none
512/472-8881, ext. 403	none
714/837-6033	none
612/633-4450	800/654-5294
708/860-9500	800/388-8888
708/860-9500	800/388-8888
617/937-3910	none
none	617/937-3910
617/937-3910	none
none	800/835-3506
408/988-1702	800/527-3766
510/657-2211	800/288-8754
714/852-1000	800/800-8600
714/852-1000	800/800-8600
510/471-6112	none
510/471-6112	none
510/471-6112	none
408/955-4343	none
408/980-1838	800/886-3935
714/583-3111	none

Adding It All Up

ALL OF THE NEW DRIVES WE TESTED turned in respectable (by CD-ROM standards) performances; even though some drives were faster than others, not one was bad. So your buying decision comes down to how important speed is to the work you're doing now or will be doing within the next year.

Graphic designers, photographers, illustrators, and others who plan to be serious Photo CD users will need the fastest CD-ROM drive they can afford. For them I recommend the Pioneer-based CD-changer drives—but *only* if they don't mind paying about $1500 for such a drive.

If money is a limitation, the Chinon CDA-535 drive ($795) and the AppleCD 300 ($599) offer solid performance at more reasonable prices.

If multimedia is your bag, the question remains: Should you buy a double-speed CD-ROM drive now and wait for the software titles to catch up in speed with the hardware? Or should you put off your purchase until next year, when CD-ROM drives with 600-KBps transfer rates will be more affordable (even though the software will still just be in transition from 150-KBps to 300-KBps transfer rates)?

It's a difficult call to make. One thing is certain about buying hardware: as soon as you do, there will be something cheaper and faster on the market—and you won't be able to upgrade. NEC is one of the few vendors that has made hardware upgrades available (for a limited time) to its CD-ROM drive customers. But whether or not NEC will offer a program to upgrade your double-speed drive to a quadruple-speed mechanism—when and if it even offers such a device—is a question the company understandably can't (or won't) answer at this time.

The importance of playing multimedia titles, or accessing Photo CD files, or using CD-ROM in general, to your work is the key question. If indeed those capabilities are vital, then study the test results, read the product table and the Editors' Choice picks, and go ahead and write that check.

If you're just curious about multimedia and Photo CD, chances are a single-speed, single-session CD-ROM drive will adequately suit your needs—for now. (It should also cost less than a double-speed, multisession drive.) Just remember that in a year or so, you'll probably want to trade up. But given the fast pace that CD-ROM software and hardware are following these days, you'd probably want to do that anyway, no matter which drive you buy today. **m**

Macworld Lab testing supervised by TIM WARNER.

MW EDITORS' CHOICE

Sheer Speed

Pioneer DRM-604X With the fastest speed and the ability to hold six CD-ROMs at once, this is the drive for true CD junkies without budget constraints. **Company:** Pioneer. **List price:** $1795.

Overall Value

AppleCD 300 This one comes close to having it all: a fast Sony mechanism, good documentation, an attractive bundle of CD titles, a slim chassis, and Photo CD access software—and the price is right, too. **Company:** Apple Computer. **List price:** $599.

Budget Choice

NEC MultiSpin 38 It's not as fast as other double-speed drives, and the lack of any real dust protection might be a concern for some. But you can't argue with the price, and its portability should please the PowerBook crowd. **Company:** NEC Technologies. **List price:** $465.

Finding the best programs for keeping track of busy schedules

Desktop

BY FRANKLIN N. TESSLER

LIKE IT OR NOT, OUR LIVES OFTEN SEEM to revolve around the clock or the calendar. Whether you're slated to attend a meeting in the company boardroom or savor your child's first birthday party, being in the right place at the right time is always important.

If you're looking for an electronic aid to keep your schedule under control, you can get a personal information manager (PIM), which organizes contacts, schedules, and to-do lists (see "Software Secretaries," *Macworld*, February 1993). Or, if a PIM has more features than you need, you can get a scheduler, which is a calendar-oriented program that keeps track of schedules.

Even the simplest scheduling programs go far beyond Apple's venerable Alarm Clock DA by providing multiple options for alarms and reminders; some let you coordinate several schedules over a network. To help you choose, I'll cover key features that you should look for and tell you which programs perform best in each category.

Also, because impressive feature sets aren't much help if software is never used, I'll help you decide whether—and which—scheduling software is right for your needs. The table "Schedulers Compared" summarizes the pros and cons of different types of schedulers, including those in PIMs.

Booking Events

MOST SCHEDULING PROGRAMS WORK BY letting you book activities (usually called events) that have specific times and dates. Just as graphics applications are often judged by the range of drawing tools, scheduling programs are gauged by the range of event options they provide.

Anatomy of an event To understand why flexibility in event scheduling is so important, consider some activities that might appear on a personal calendar.

- Attend a conference from Wednesday through Thursday (a multiday event).
- Meet with your accountant on Monday from 10 a.m. to 10:30 a.m., with a reminder one hour in advance (a timed event with alarm).
- Attend your weekly soccer game on Sunday afternoon at 2 p.m. (a timed recurring event).
- Go to a 2 p.m. dentist appointment on Thursday (a timed, open-ended event).
- Saturday is your mom's birthday party (a recurring special event).
- Monday is Labor Day, so you don't have to go to the office (a holiday).
- Pick up your boss at the airport on Tuesday at 5 p.m. (a timed to-do).
- Clean out the rain gutters when you get a chance (an untimed to-do).

Multiday events The more event types the program supports, the less you'll be forced to improvise for special occasions. Activities that span more than one day are a good example—although you can simulate them using multiple single-day events, that's far less convenient than using multiday events.

Amaze's Daily Planner supports activities that span several days, but I prefer the approach of After Hours Software's DateBook and Now Software's Now Up-to-Date. Both programs use graphics called banners to mark multiday events on the monthly calendar, although only Now Up-to-Date lets you assign categories and priorities to banner events. Now Up-to-Date also lets you reschedule banners by dragging them around. But Now Up-to-Date doesn't let you define banners that cross weekends, which DateBook does.

Recurring events Support for recurring events is another key feature. You should be allowed to enter any repeating interval from minutes to years. Likewise, special circumstances (such as a meeting that takes place on the second Thursday of every month) should be handled easily. When you book a repeating event, you should be allowed to enter the total number of occurrences or specify the date of the last event in the series.

Amaze Daily Planner, DateBook, and Now Up-to-Date all provide excellent support in this area, with DateBook having the edge because of how it lets you modify repeating events. When you edit a



Calendars

recurring event in DateBook, you have the option of applying the changes to as many of the occurrences as you want.

Priorities and categories Scheduling software helps you manage your time effectively by prioritizing activities. Most programs let you assign three event priorities—usually low, medium, or high, or a similar variation. Now Up-to-Date lets you define up to ten event-priority levels.

Likewise, event categories let you group events to suit your work habits. For example, you can distinguish business from personal events by assigning them to separate categories. Now Up-to-Date's ability to define sets of categories is especially helpful. With one menu selection, you can instantly view events from any subset of categories while hiding all other events. In contrast, Numa Technology's Data-Areas provides only four to-do and three calendar-item categories, while Essential Software's Easy Alarms doesn't let you categorize events at all.

Assigning categories and priorities to events should be as painless as possible, and you should be able to set default values for both. Most scheduling programs use pop-up menus to let you specify categories and priorities when you enter new activities, a good solution as long as your category list remains fairly short.

To-dos Although some schedulers treat to-dos as routine events, they really demand special handling. At the very least, you should be able to mark to-dos as uncompleted or done. Dated to-dos should advance automatically until you take care of them or delete them from your calendar. (Pastel Development Corporation's DayMaker lets you forward uncompleted to-dos a day, a week, or a month at a time.) Undated to-dos like Now Up-to-Date's are another handy feature, although some people claim that by assigning dates to tasks you're more likely to do them. Attain Corporation's In Control deserves mention for its strong support for to-dos.

Event descriptions Most schedulers let you give separate titles and descriptions to events. The title should convey the event's main subject or goal ("Strategy meeting in conference room"), but it should be short enough to display fully in list views. The description field should provide ample space to let you enter any other pertinent event information, and both fields should support cut and paste.

Some scheduling programs like DayMaker and Powercore's TimeVision let you use pop-up menus to enter event times, an approach I find unwieldy be-

ILLUSTRATION BY ANDREW FAULKNER

cause the menus can be very long. I also object to programs like PMC Telesystems' Rendezvous that force you to schedule activities by clicking next to the event's time on a daily time log—this often limits your choice of start times.

Fortunately, most schedulers let you post times from the keyboard by typing the hours, minutes, and AM or PM, separated by tabs. DateBook goes one step further; when you enter 2145, the software is intelligent enough to know that you mean 9:45 p.m., saving you keystrokes. DateBook can also calculate an event's duration when you enter its starting and ending times.

Top contenders compared For overall flexibility in scheduling events, Now Up-to-Date gets the nod over DateBook, its closest competitor, largely because of its superior handling of special and multiday events and because it supports undated to-dos. However, Now Up-to-Date is far from perfect. For example, its lack of support for timed open-ended events is a notable omission, as is its inability to warn you when you try to schedule two conflicting events.

If categorizing activities is important to you, DayMaker is worth considering because of its hierarchical system for tagging events. DayMaker lets you define categories, or tags, using an outliner-like tool, called the Browser. For example, a category called Business Correspondence might have Regular Mail, E-mail, and Faxes as subcategories. And because DayMaker enables you to create undated text notes in addition to calendar items, you can use it as a free-form database to store all sorts of information.

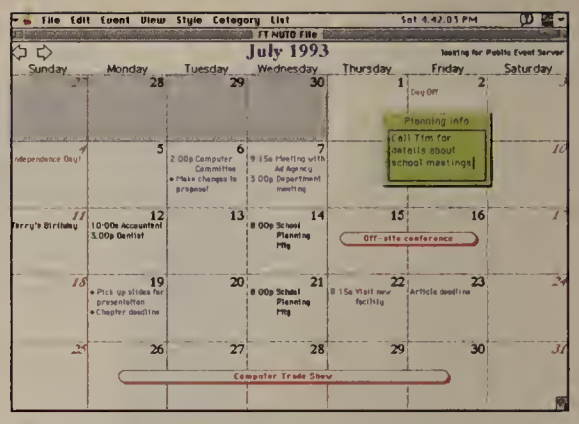
Viewing Calendars

BOOKING EVENTS IS ONLY HALF THE battle in juggling a complex schedule: a good scheduler should also let you peruse your agenda of activities in any fashion. Not surprisingly, most Macintosh schedulers use the familiar wall-calendar metaphor to display events. In this approach, individual days appear as rectangles on a grid, with event times and descriptions superimposed (see the screen image "Month at a Glance").

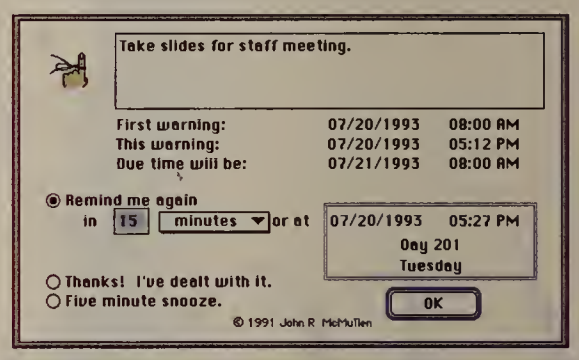
Text control To cram more event information into limited monitor space, some programs let you adjust the font and size of displayed text, as well as turn word wrap on and off for event text. Optional hiding of weekend days to make additional room for weekday events is another good way to make the most of a restricted viewing area.

Multiple time spans In the same way that different types of paper calendars (like wall calendars and appointment books) can cover different time spans, many scheduling programs let you display events for days, weeks, months, and years. In many programs (including DateBook and DayMaker), the views are mutually exclusive, so, for example, you can't open both the weekly and daily calendars.

If this limitation bothers you, Now Up-to-Date, CE Software's Alarming Events, and TimeVision all let you display more than one view simultaneously. But TimeVision is hampered by serious limitations such as fixed-size windows.



Month at a Glance Now Up-to-Date's monthly calendar is easy to customize. Here, personal items are displayed in black type, while business-related activities show up in blue.



Nagging Alarms When a Smart Alarms Plus reminder appears, you can put it off for a while, or you can postpone all alarms for five minutes.

Team Building Technologies' Agent DA and MacVonk USA's TeamAgenda take the most innovative approach to letting you adjust the number of calendar days to view. In both programs, controls at the bottom right of the calendar window let you choose how many days and weeks to display. While some of the more unusual permutations (say, three days a week over five weeks) might not be terribly helpful, the flexibility is welcome.

Busy-ness levels Another feature that may appeal to some users is a visual indication of how full any given day's schedule is. For example, DateBook uses horizontal bars to denote "busy-ness" levels in its month and year views, while TimeVision uses tiny triangles and squares to denote activity loads. These indicators can be helpful when you glance at your schedule from a distance, although TimeVision's markers are too small to be of much use.

List views One advantage of computer-based schedulers over paper ones is their ability to display a series of events in either a calendar or a scrolling list format. Almost all of the scheduling programs provide list views; Alarming Events is a notable exception. Some, like Rendezvous, restrict the list view to to-do items, while others, like Agent DA and TeamAgenda, provide hybrid views that display lists of events on a dated grid.

Because activity lists are so handy (especially in printed form), the best

Scheduling on the Road

An oft-repeated argument against computerized schedulers is that you can't take them with you when you're traveling. So, for the benefit of itinerant schedule-minders, here are three solutions, in order of increasing cost.

1. **Carry a printout** If you simply want to carry a copy of your schedule with you and don't intend to modify it, a loose-leaf paper calendar will suffice. All the schedulers let you print event information, and some even include predefined layouts to fit personal organizers like Day Runner and Filofax. (Franklin Quest [801/975-9992] sells a Macintosh scheduler called Ascend 3.0 that works with the Franklin Planner organizer system. The software sells for $199.95.)

2. **Use a palmtop** If you're willing to spend up to $500 or so, consider purchasing a palmtop organizer like the Sharp Wizard (201/529-8200). Several Macintosh programs (including Now Software's Now Up-to-Date and JAM Software's Smart Schedules) provide two-way transfer of event information between the Mac and the Wizard through an optional cable that connects to the Macintosh serial port. Sharp's newest top-of-the-line organizer, the OZ-9600, will even let you transmit data to and from the Mac using an infrared module slated for release later this year.

3. **Use a PowerBook** If you can afford the expense and don't mind the extra weight, carrying your scheduling software with you on a PowerBook may be the ideal solution. While you're away, you can access your calendar; you can reconcile your PowerBook and desktop schedule files when you return. (If you're using a PowerBook Duo as both a portable and a desktop Mac, you don't need to worry about the reconciliation.) If your home or office is set up with a modem and AppleTalk Remote Access, you can even call in and update your schedule while you're on the road.

scheduling programs let you tailor list views extensively. For example, both DayMaker and Now Up-to-Date let you define custom list views that display any subset of events and to-dos, and even let you specify what information about each item to include.

Timely Reminders

ANOTHER ARGUMENT IN FAVOR OF using software to manage your schedule is the computer's ability to nag you when something needs attention.

It's important for alarms to appear whether or not the scheduling application or DA is actually launched, unless you plan to keep the program running in the background at all times. Usually, this functionality comes in the form of a start-up file or extension. (One conspicuous exception is JAM Software's Smart Schedules, which doesn't let reminders activate independently of the application.)

Because alarms usually serve to remind you about important items on your calendar, it's most convenient to set them when you enter the associated event or to-do. Of all the schedulers, DateBook and In Control provide the most flexibility in setting reminders—you can adjust them to ring either at a fixed interval before the event (say, one day before) or at a specific date and time.

Scheduling programs also differ in how they notify you when an alarm goes off. The most intrusive alarms produce a sound and interrupt whatever you're doing with a dialog box that demands some sort of response—you're forced to either dismiss the reminder or delay it for a specified amount of time (see the screen image "Nagging Alarms").

Some schedulers, such as Now Up-to-Date, automatically postpone unanswered alarms after a default interval has elapsed. Now Up-to-Date also gives you the gentler option of flashing the reminder text in the menu bar instead of displaying a dialog box. You can set the alarm to snooze or dismiss it without launching the application.

Special Features

SEVERAL OF THE SCHEDULING PROgrams offer unique features that appeal to different types of users.

Whimsy Amaze Daily Planner incorporates diversions including cartoons and animations (Gary Larson's "The Far Side" or Cathy Guisewite's "Cathy," both favorites of mine) and Trivial Pursuit quizzes. The cartoons are entertaining, and show up nicely on a color monitor. Similarly, LizardTech (505/989-7117) has announced the Rock History Electronic Day-Planner and Personal Journal.

But while the levity makes for a welcome break from managing a heavy schedule, Amaze Daily Planner's graphics files can consume several megabytes of hard drive space.

Scripting language In a more serious vein, Easy Alarms lets you write scripts that execute when alarms activate. Easy Alarms' scripting language is similar to HyperCard's, and includes support for

Scheduling Group Events

Even hard-nosed advocates of paper calendar planners will admit that juggling multiple schedules on paper is often frustrating. In my medical office, simple tasks like finding free time for two people to meet is a challenge; trying to arrange a conference with five participants can be next to impossible. (Doctors are notoriously difficult to schedule.)

Network support Most of the scheduling programs reviewed here let you share calendar files over an AppleTalk network using AppleShare or System 7's file sharing. Several, including ASD Software's Active Memory, Essential Software's Easy Alarms, and Now Software's Now Up-to-Date go beyond the basics by providing specific network support. For example, Now Up-to-Date's networking scheme lets users view and modify each other's schedules with a minimum of fuss.

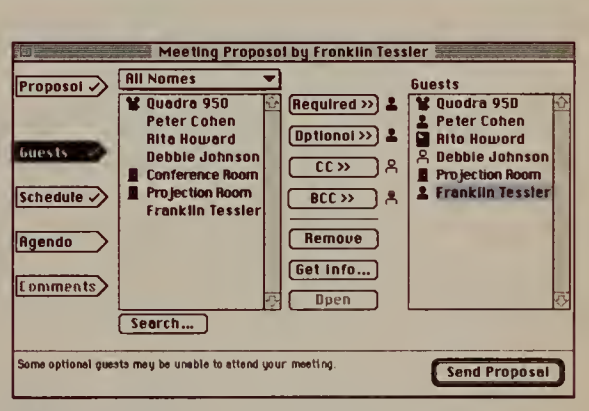
Now's server software is implemented as an extension that operates in the background under either System 6 or System 7. The server doesn't require a dedicated Mac, although heavy network traffic will eventually slow down the host computer. Events posted to categories that a user defines as public automatically become visible to all other users on the network. (For security purposes, public categories can be assigned separate read and write passwords.)

Event reconciliation A welcome feature is the ability to view and edit public events even when you're away from the network—when you reestablish connection later, Now Up-to-Date tries to reconcile the public events in your calendar file with those on the network server. If Now Up-to-Date finds that an event you modified while offline has been altered by another user, the program gives you the option of discarding your changes or dumping the event into a special category called Unreconciled Events.

Scheduling conferences Although you can use any scheduling program that lets you view other people's calendars to find free time slots for meetings, only On Technology's Meeting Maker, Microsoft's Schedule+, JAM Software's Smart Schedules, and MacVonk's TeamAgenda provide tools for scheduling conferences.

Schedule+, an add-on to Microsoft Mail, lacks the functionality of its competitors, especially as a stand-alone schedule manager.

Smart Schedules, from the developer of Smart Alarms, is a bit uneven in its first release—for example, help was not implemented in the version I tested, and I encountered a few glitches with controls in some of the windows. Still, if JAM Software's long-standing support for Smart Alarms is any indication, future updates should be much improved.



Call to Order Meeting Maker lets you arrange conferences by selecting "guests"—people and resources—from a list.

Both Meeting Maker and TeamAgenda require that you install special server software. As with Now Up-to-Date, though, the server Mac can be used for other tasks if your workgroup is small enough. Meeting Maker's interface is so intuitive that most experienced Macintosh users will be able to schedule meetings with minimal reference to the user's guide.

After entering the meeting's title, the next step is to choose the participants, or guests. Guests can be required or optional, and you can send public or blind meeting notices to people who are not invited to the meeting. You can search for a suitable meeting time manually, or you can use Meeting Maker's Auto-Pick feature to locate the first free time that all the required guests can meet. Prospective guests receive notices over the network and can accept, decline, or defer the invitation.

In addition to selecting a meeting's participants, you need to locate a suitable meeting site and equipment. Both Meeting Maker and TeamAgenda let you define resources, which can be conference rooms, video projectors, or even company limousines. In Meeting Maker, resources can be assigned hours of availability, can be associated with telephone numbers, and can be marked as meeting locations. When you schedule a meeting, you can specify the resources that you require in the same way that you choose guests.

Because of its well-designed interface, I prefer Meeting Maker for meeting planning. But Meeting Maker is a poor choice as a personal scheduler; it stores all event information on the server and therefore runs more slowly than TeamAgenda.

SCHEDULERS COMPARED

	Product	List Price	Views (month [a]/ week/list)	Configurable Recurring Events	Pop-Up Alarms [b]	Pros and Cons
After Hours Software	DateBook 1.5.1 [c, d]	$125.00	●/●/●	●	●	PIM scheduler has multiple views and excellent event-entry interface, but support for multiday events could be improved.
Amaze	Amaze Daily Planner 2.0	$59.95	○/●/●	●	●	Whimsical interface with cartoons and other entertaining diversions. Replacement cartoon packages available for $24.95 each.
ASD Software	Active Memory 2.0	$199.00	○/○/●	●	●	Spreadsheetlike format with tools for sending events to other users on network. No calendar views.
Attain Corporation	In Control 2.0	$129.95	●/●/●	○	●	Powerful outline-based to-do manager with calendar view that can be turned on and off.
Brainchild	Shortlist 1.0.1 [c]	$149.00	○/●/●	○	○	Fast PIM with contact manager and scheduler.
CE Software	Alarming Events 1.1	$99.95	○/●/○	●	●	Desk accessory with timed events, dated to-dos, and alarms. No monthly or list views.
Contact Software International	ACT for Macintosh 1.0 [c]	$395.00	●/●/●	●	○	PIM with contact manager and word processor. Poorly organized reference manual. Interface could follow Macintosh standards more closely.
Cornice Software	OfficeMaster 2.0.4 [c]	$249.00	○/●/●	○	○	PIM with single-user and network versions. Includes electronic-mail function.
Essential Software	Easy Alarms 2.1	$99.00	●/○/●	●	●	Reminder-activated scripting language included. No support for event priorities or categories.
Heizer Software	Connections 2.1 [c]	$79.00	●/●/●	●	●	HyperCard-based PIM with functional scheduling module, but slow. Each year's calendar must be built separately.
JAM Software	Smart Alarms Plus	$125.00	○/○/○	●	●	Very good basic reminder system with simple, no-frills interface.
	Appointment Diary 3.7	$90.00	○/○/○	○	○	Limited appointment calendar.
	Smart Schedules 1.0	$260.00 [e]	●/●/●	●	○	Full-function scheduler with address book and meeting arranger. Good network support, but several features are missing from first release.
MacVonk USA	TeamAgenda 1.0.6	$99.00 [e]	○/●/●	●	●	Personal and workgroup scheduler with strong network support. Requires nondedicated server.
Microsoft Corporation	Schedule + 1.0	$195.00 [f]	○/○/○	○	●	Requires Microsoft Mail. Limited event options.
Nine to Five Software	The Nine to Five Office 2.0 [c]	$99.95 [g]	○/●/●	○	○	Inexpensive, HyperCard-based PIM. Relatively slow.
Now Software	Now Up-to-Date 2.0	$99.00 [e]	●/●/●	●	●	Excellent stand-alone scheduler. Users can share calendars over network..
Numa Technology	Data-Areas 1.0	$59.00	●/○/●	○	○	PIM with very simple address-book, note, and scheduling modules.
On Technology	Meeting Maker 1.5 [d]	$495.00 [f]	● [h]/●/●	●	○	Excellent group meeting scheduler. Requires nondedicated network server.
Pastel Development Corporation	DayMaker 2.0	$129.95	●/●/●	●	●	Supports timed events, to-dos, and note items. More extensive item-tagging options than other schedulers, but harder to learn than some other schedulers.
Personal Info-Mation Management	Info-Mation 1.1 [c]	$189.00	●/●/●	●	●	Relatively slow. HyperCard-based PIM can schedule events graphically.
PMC Telesystems	Rendezvous 4.0.1	$149.00	●/○/○ [i]	●	●	Use of three separate data files is inefficient. Awkward event-scheduling interface.
Powercore	TimeVision 1.0	$99.00	○/●/●	●	●	Scheduler with note card and memo functions. Event types too similar to be useful.
Team Building Technologies	Agent DA 2.1.3	$99.00	●/●/●	●	●	Simple desk accessory scheduler with flexible viewing options but no event priorities or categories.
Visionary Software	First Things First 3.0	$79.95	○/●/●	●	●	List-based scheduler with timed and untimed events and to-dos. Floating desktop-clock for quick access.

● = yes; ○ = no. [a] With superimposed event information. [b] Independent of program. [c] This PIM is covered in "Software Secretaries," Macworld, February 1993. [d] Updated version is expected to ship [e] Price is for five-user pack. [g] $19 through August 1993. [h] Activities shown only in graphs view; no other view options. [i] Has list view for to-do items only.

variables and conditional branching, as well as for Apple events if you are running System 7.

For those with the proper inclination, scripting (especially from within the program) can be a very powerful feature—for example, you can write a script that sends a reminder message to a pager application like Ex Machina's Notify (718/965-0309) to relay to your beeper (see the screen image "Script Support").

Deciding What's Right for You

ALTHOUGH THIS MAY SOUND STRANGE, scheduling software may be a waste of money for some people. In researching this article, I talked to people who spent hundreds of dollars on Macintosh schedulers before abandoning them for paper calendars. I doubt that many word processor owners would trade in their keyboards for pen and paper, which shows that the advantages of computer-based scheduling are not as clear-cut.

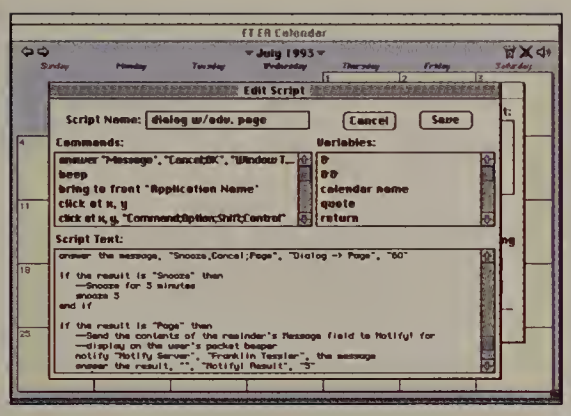
Paper calendars have two advantages: low cost and portability. For many people, the promotional pocket-size calen-

Consumer Contact Number: Toll	Consumer Contact Number: Toll-Free
818/780-2220	none
206/820-7007	800/395-1546
714/624-2594	none
617/776-1110	none
513/831-8451	none
515/224-1995	800/523-7638
214/919-9500	800/365-0606
714/985-8323	none
914/889-8365	none
415/358-8600	800/365-0606
203/630-0055	none
203/630-0055	none
203/630-0055	none
403/232-6545	none
206/454-2030	800/426-9400
303/443-4104	800/292-5925
503/274-2800	800/237-3611
203/256-1973	800/274-5221
617/876-0900	none
212/941-7500	none
510/559-4211	800/444-4746
604/255-9949	none
815/468-3737	800/237-4754
514/278-3010	none
503/246-6200	800/877-1832

by this summer. [e] *Multiuser pack also available.*

dars that often come free in the mail work just fine. And for those willing to spend up to $50, paper-based organizers like the Day Runner are widely available.

In deciding which scheduling program you should buy (or whether you need one at all), it helps to consider the features that paper systems can't match at any price.



Script Support This Easy Alarms script sends a reminder message to a pocket pager using Ex Machina's Notify software.

Alarms and reminders Unless you're disciplined enough to check your paper calendar daily, a computer-based system that reminds you about important appointments and to-dos can be a lifesaver. Like paper calendars, though, computerized alarms demand that you turn the Macintosh on now and then, but they do offer the advantage of accumulating unanswered reminders for you.

Although you can use alarms to remind you about any events on your calendar, I find them especially useful to nag me about those items months in the future that I'm most likely to forget, like birthdays, conferences, and tax payments. For events that require advance preparation, I set an alarm to go off several weeks beforehand. Obviously, it's important to make sure that the reminder's title and description are specific enough to jog your memory—an alarm can't be much help if you don't recognize the event you're being reminded of.

Tracking past events If you're conscientious in entering information about meetings and other important events into a scheduling program, you will gradually build up an archive of past activities. Just as a computerized check register can help you explain last year's charitable donations to the IRS, a scheduler can provide quick access to all sorts of useful information such as the last time you had your car serviced or visited the dentist.

If your calendar file grows to unmanageable proportions, you can delete and archive events older than, say, a year or two. All the scheduling programs I reviewed let you export information in text-only file format, making it simple to import the data into another scheduler, print it out, or reload it if you need to refer to it later.

Arranging meetings and coordinating workgroups For those who require it, coordination of schedules is the most seductive argument in favor of computerized scheduling. If you often need to scan your colleagues' appointment calendars, or better yet, if you have an assistant who handles your scheduling for you, programs like Now Up-to-Date can be a godsend. And software like On Technology's Meeting Maker can pick times for conferences, book meeting rooms, and notify participants about agendas (see the sidebar "Scheduling Group Events").

The Pick of the Lot

BEFORE YOU PAY FOR A HIGH-END SCHEDuler that you might not use, I suggest you sit down and list your requirements. If all you need is a reliable alarm system for your Macintosh and can do without the frills offered by comprehensive schedulers like DateBook or Now Up-to-Date, check out JAM Software's Smart Alarms Plus or Visionary Software's First Things First (FTF). FTF has an especially appealing interface: when it's not open, FTF shrinks down to a compact clock that floats on the desktop, ready to be opened with a double-click.

For managing the daily schedules of one or more users, I recommend Now Up-to-Date. Despite a few shortcomings, Now Up-to-Date offers excellent functionality in a single package.

Finally, if automated meeting arrangements are your chief requirement, On Technology's Meeting Maker should be your first choice. m

FRANKLIN N. TESSLER, a radiologist and *Macworld* contributing editor, turned in this article on time when multiple alarms sounded at once. He is recovering nicely.

MW EDITORS' CHOICE

Alarm System

First Things First A list-based reminder system with support for item priorities and categories and a floating clock for rapid access. **Company:** Visionary Software. **List price:** $79.95.

Smart Alarms Plus The first Macintosh alarm utility is still a good choice for its basic, no-nonsense approach to reminders. **Company:** JAM Software. **List price:** $125.

All-Around Scheduler

Now Up-to-Date Customizable views, flexible event options, and strong network support combine to make this a top scheduling application. **Company:** Now Software. **List price:** $99.

Meeting Scheduler

Meeting Maker Meeting Maker's intuitive interface lets new users get up to speed quickly. **Company:** On Technology. **List price:** five-pack $495.


ROUTE
?

Rating Routers

BY MARGIE WYLIE

Macworld Lab tests 11 LocalTalk-to-Ethernet routers. Which one's right for you?

ROUTER. LIKE MOST WORDS BEST NOT uttered in polite company, it is enough to make the initiated uneasy and the naive downright anxious. And for good reason. Choosing and installing the staple Macintosh router—the kind that connects LocalTalk and Ethernet networks—can be frighteningly complex, mysterious, and expensive. What starts out as a seemingly simple process (the LocalTalk-bone connected to the Ethernet-bone) can escalate into major surgery on alien anatomy.

If you break out in hives at the thought of adding a router to your network, throw out the calamine lotion and read on. With increasing competition, routers have grown easier to install, configure, and manage. Today's routers keep their cool when the power goes out. They can be managed more easily, with software that reaches out over the network, automatically configures the router, and keeps security tight. But best of all, they are getting cheaper, with some routers selling for under $1000.

Macworld Lab tested 11 LocalTalk-to-Ethernet routers that sell for under $3500 and, with one exception, are designed expressly for Macintosh networks. Most of these routers could work just as well for a workgroup in a large company as for a small business—anyone who wants to add a few Ethernet nodes to a LocalTalk workgroup, speed up access to a server on LocalTalk, or communicate with a corporate Ethernet network. (An appealing alternative for small networks are hybrid hub/routers; see "Three New Ways to Wire Your Network.") Macworld Lab tests found little difference in speed among the routers tested. Instead, router makers have set out to distinguish themselves with easier installation, better configuration and management, more sophisticated security, or other less tangible features.

Routers are devices—part hardware, part software—that direct traffic flow between the different physical segments of a network. (Think of a physical segment as each workgroup as it stands isolated before being connected to the router.) *Hardware routers* come complete with their own hardware and software, including software for configuring the router when it is installed and managing it afterward. *Software routers* run on a Mac (or, in the case of Novell's NetWare MultiProtocol Router 2.0, an Intel-based PC) typically dedicated to routing.

While bridges, repeaters, and hubs blindly pass network traffic down the wire without being aware of where it is destined, routers are aware of the existence of the rest of the network. Gateways, which often run in tandem with routers, translate network packets from one protocol to another but also don't consider the traffic's destination. Routers are responsible for knowing where network data is headed, making sure it's addressed correctly, and directing that data on the most efficient path available.

Since technical punctiliousness often takes a backseat to marketing in product names, some routers may be called bridges or gateways. To figure out what a device really does, read its description carefully or ask the vendor.

In AppleTalk networks, each physical segment attached to each port of a router must be assigned a unique network number. (Don't confuse a network number with a zone, which is a logical network division. An AppleTalk zone can encompass more than one physical network segment. Conversely, an Ethernet or Token Ring segment running AppleTalk Phase 2

ILLUSTRATION BY HUGH KRETSCHMER

can include more than one zone.) Each router on the network keeps a table identifying the network numbers directly attached to it and those attached to the other routers on the network.

When a packet of network data passes through a router, the router matches the packet's address to a routing table, forwarding it along the speediest route to its destination. (That's the route with the fewest routers, or *hops*, between the first router and the packet's destination.) The router may also adjust addressing conventions if the packet is traveling between LocalTalk and Ethernet segments.

Sometimes routers acquire their configuration initially through *seeding*, a process by which one router acts as the point of reference for other routers on the network. When some routers are started up or restarted, they look for a seed router and copy its routing tables. If no router is designated as a seed router, you may have to manually enter network numbers using configuration software. Increasingly, routers are sophisticated enough that when no seed router is present, they may default to a preset, arbitrary configuration, useful only in a network without any other routers. Or routers may be able to discover existing network numbers and other routers just by eavesdropping on network traffic.

Why Route?

THE MOST COMMON AND MOST OBVIOUS reason to buy a LocalTalk-to-Ethernet router is to add higher-speed, 10-megabits-per-second (Mbps) Ethernet nodes to an existing 230-kilobits-per-second (Kbps) LocalTalk network. Installing Ethernet on your workstation will noticeably speed up how fast you can access a server, transfer large files, print, or perform any other operation where network throughput is the bottleneck. Ethernet costs more than LocalTalk, because it requires extra hardware for most Macs. Using routers, however, can save money, because you install Ethernet only on those nodes that really need the speed, while leaving the rest of the network on less expensive LocalTalk cabling. Routers can also help you better manage your network by keeping one workgroup's traffic from leaking into other workgroups and slowing them down. Routers can connect isolated LocalTalk workgroups to campuswide or companywide Ethernet networks.



SCOTT PETERSON

Hardware Picks Farallon's InterRoute/5 (top) combines speed with easy installation and management. Check out Compatible's EtherRoute (bottom) for multilevel security options.

Speed

WHILE IT'S TRUE THAT A SLOW ROUTER affects a network's performance, Macworld Lab found that most routers today perform quite comparably (see "Can Your Router Keep Up?"). To help determine what kind of speed you can expect, we tested how long it takes for routers to send information in a simple configuration (LocalTalk-to-Ethernet) and in a backbone configuration (LocalTalk-to-Ethernet then Ethernet-to-LocalTalk) common to large network sites. We started with one pair of Macs and built up to four pairs communicating simultaneously, a reasonably heavy load for the typical general-purpose workgroup. (For more about router performance, see *Lab Notes* in this issue.)

International Transware's EtherWay turned in the best one-pair performance in the single-router test but lost its lead when it bogged down under traffic. While APT Communications' ComTalk HX turned in middling times for one and two pairs, it sweated the least under the pressure of heavier loads. The ComTalk HX not only turned in the best time under the heaviest loads, but its performance degraded the least in the single router test between one and four pairs. Farallon's

Ten Tips for Smoother Routing

1. Avoid the number one mistake: Don't assign two network segments the same number or an overlapping number range. If you use a seed router, you might have to reconfigure the network to find this error.

2. Plan before you install. Draw how your network will look, where your routers will sit, and how network numbers and zones will be assigned.

3. Keep a record. Record every change you make to your network and any problems or oddities to help you or your router vendor solve problems later on.

4. Remember, zones aren't networks and vice versa. Network numbers mark each physical segment of the network that hangs off a router port. Zones are logical groups that, for your convenience, can include more than one network number. AppleTalk Phase 2 networks even let you divide one network into several zones.

5. Run AppleTalk Phase 2 where you can. Many autoconfiguring routers default to AppleTalk Phase 1 on their Ethernet ports. You'll get better performance, bigger networks, and more flexible zones if you configure for Phase 2.

6. Beware of seeding. If you are in a small network, seeding may create more problems than it's worth. To be absolutely certain you won't perpetuate a conflict, you can manually configure all routers or just start with one seed. When the network grows, you can use more than one seed router. Some routers even let you designate seeding port-by-port. But the best route might be soft-seed options that try to "read" your network before spreading around misinformation.

7. Passwords: use 'em if you got 'em. You never know what a disgruntled or simply curious user might do to your network. If your hardware router stores your password in on-board nonvolatile memory, write it down somewhere safe. If you lose it, you are configured forever.

8. Router fascism is good. Make rules about adding routers to the network, and stick to them. Rule number one should be that all routers are configured and recorded by one person or group.

9. Take advantage of half-routers. If you're using a software router, take the time to learn to use the dial-in portions to support users working at home or to occasionally connect two long-distance networks. In most cases, it's well worth the price of a 9600-bps modem.

10. Always look ahead and behind. Make sure your new router will support any expansion or special needs you expect in the next couple of years. If you already have routers, make sure you aren't buying a router that won't support the other end of a TCP/IP tunnel.

InterRoute/5 also vied for top placement, coming in second. Cayman Systems' GatorBox CS started out close to the middle of the pack with one pair, but under a load (three and four pairs) it dropped to last place by a slim margin.

For the backbone test, the InterRoute/5 was the winner by a small margin. It performed the fastest under all loads, with the ComTalk HX running a close second. Webster Computer Corporation's MultiPort Gateway and Shiva Corporation's FastPath 5 also performed well in the backbone test. The GatorBox CS and Compatible Systems' EtherRoute performed the slowest.

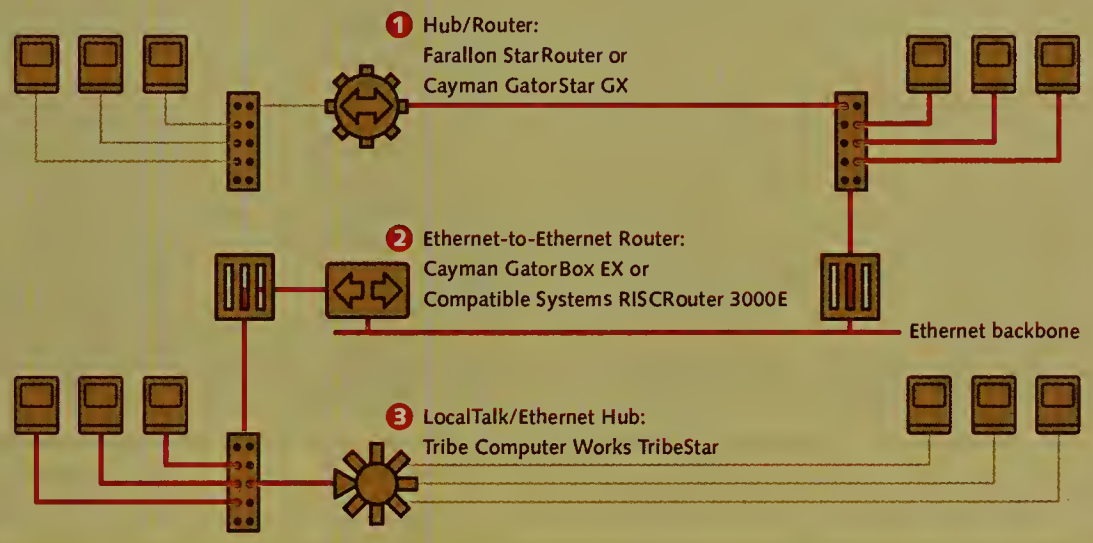
All three of the software routers we tested ran as fast as or faster than hardware routers. But be warned: we installed software routers on dedicated computers not quite ready for the cast-off heap—we ran Farallon's Liaison Internet Router and the Apple Internet Router 3.0 on Mac IIci's, and Novell's NetWare MultiProtocol Router on a Compaq DeskPro 4/25i, a 25MHz 486SX. If you are looking to save a little cash by installing a router on a spare computer, bear in mind that an SE, SE/30, or Classic just isn't going to get this kind of performance. As for the NetWare MultiProtocol Router, Novell recommends that you run it on at least a 386 PC. None of the three software routers tested appreciably faster or slower than the others. However, Liaison suffered noticeably when run in the background on a nondedicated Mac.

Three New Ways to Wire Your Network

1 A new breed of combination hub/routers are making it more affordable for small workgroups to add Ethernet. The Farallon StarRouter ($3299) and Cayman GatorStar GX ($3595) combine two pieces of hardware in one. With 12 to 24 LocalTalk connections, these hub/routers let you create a LocalTalk network and add Ethernet in one fell swoop. Cayman's product comes with built-in TCP/IP gateway and DECnet support. Users who want to add a hub or an Ethernet backbone a bit at a time can just string these hub/routers together.

2 To segregate traffic generated by Ethernet workgroup networks from an Ethernet backbone, use an Ethernet-to-Ethernet router, like Cayman's GatorBox EX ($3495) or Compatible Systems' RISCRouter 3000E ($2995).

3 The TribeStar from Tribe Computer Works ($1795; 510/547-7800), a LocalTalk/Ethernet hub, bridges eight LocalTalk devices (or entire networks) with one Ethernet network but does not route. The TribeStar uses Tribe's packet-switching technology to allow the eight attached LocalTalk devices to bombard a server or printer on Ethernet with simultaneous requests and communicate simultaneously with each other rather than one at a time.



Installation and Configuration

EVEN FOR EXPERIENCED NETWORKERS, setting up a router can be frustrating. Since there's little room for competition on speed, many router companies have tried to simplify the installation and configuration. Their solutions range from better documentation to simpler (or sometimes automatic) configuration to more-intuitive interfaces.



Getting Carded Webster's HyperCard configuration software is cumbersome, peculiar, and difficult to understand, presenting a challenge to the novice installer. It can also try the patience of the more experienced network manager, who's forced to go card by card through every installation step.

By far the simplest router to install was the Apple Internet Router, one of the three software routers tested. Using Apple's familiar Installer, a simple control panel, and a management application, we had this router up and running in less than five minutes. The documentation is brief and to the point, with sufficient explanation. The EtherWay offers an interesting twist on configuration software; its interface lets installers fill in information like network numbers and zone names on a graphical representation of the network.

Kudos go to Cayman for the thoroughness of the GatorBox CS's canonical documentation, especially for its careful explanation of the intricacies of TCP/IP. For simplicity, user-friendliness, good organization, and just the right amount of information, however, Farallon's InterRoute/5 documentation is tops. It leads you through unspectacular but straightforward installation and configuration. But unlike the other routers reviewed, the InterRoute/5 requires an extra piece of hardware—a harmonica or a punchdown block for installation on the LocalTalk side.

At two hours, the NetWare MultiProtocol Router took, by far, the longest to install. Chalk up the extra time to the fact that you have to install a full NetWare server before moving on to installing and configuring the router. The documentation forces you to hopscotch between and within manuals to patch together a full set of instructions from prose that alternates between patronizing and impenetrable. For experienced NetWare 3.11 server installers, however, this router should prove a cakewalk.

Probably the most irksome Macintosh-controlled installation we encountered was Webster Computer's MultiPort Gateway. Its HyperCard configuration stack is cumbersome, peculiar, and difficult to understand. The accompanying documentation matches the software's configuration process card-by-card, but

LOCALTALK-TO-ETHERNET ROUTERS

	HARDWARE ROUTERS					
	APT Communications	Cayman Systems	Compatible Systems	Dayna Communications	Farallon Computing	International Transware
Product	ComTalk HX	GatorBox CS	EtherRoute	PathFinder	InterRoute/5	EtherWay
Tested by Macworld Lab	●	●	●	●	●	●
List price	$2500–$5750 [a]	$2795–$2995 [b]	$1495–$2195 [c]	$899	$3299–$3499 [b]	$1499–$1599 [d]
MAXIMUM PORTS						
LocalTalk	1–6	1	2	1	4	1
Ethernet	1 or 2	1	1	1	1	1
SECURITY						
Network hiding	●	●	●	○	●	●
Device/service hiding	●	●	●	○	○	●
Zone hiding	●	●	●	○	○	●
Password protection	●	●	●	○	●	●
MANAGEMENT						
Over network	●	●	●	●	●	●
Over serial line	○	○	○	○	●	○
SNMP support	●	●	● [c]	○	●	○
TCP/IP						
Gateway	●	●	● [c]	○	●	●
Tunneling	●	●	● [c]	○	●	○
OTHER FEATURES						
Half-routing [h]	○	○	○	○	○	○
Protocols supported	AppleTalk, TCP/IP	AppleTalk, DECnet, TCP/IP	AppleTalk, DECnet [c], TCP/IP [c]	AppleTalk	AppleTalk, TCP/IP	AppleTalk, DECnet TCP/IP
Downloadable upgrades	●	●	●	○	●	●
Ethernet media	thick and 10BaseT [i]	thick and thin [i]	thick and thin, or thick and10BaseT	thick, thin, and 10BaseT	thick [i]	thick and thin, or Apple Ethernet
Warranty	2 years	2 years	1 year	lifetime	1 year	1 year
Toll-free tech support	●	○	●	○	○	○
Online tech support	AppleLink	AppleLink, Internet	AppleLink, Internet	America Online, AppleLink, BBS	America Online, AppleLink, BBS, CompuServe, Internet	AppleLink, CompuServe
Consumer contact: toll	301/831-1182	617/494-1999	303/444-9532	801/269-7200	510/814-5000	415/903-2300
Consumer contact: toll-free	800/842-0626	800/473-4776	800/356-0283	○	○	800/999-6387

● = yes; ○ = no; NA = not applicable. [a] Depending on number and configuration of ports. APT also offers the ComTalk HF with three LocalTalk ports; one Ethernet port; and thick, [b] Depending on form factor. [c] Depending on purchase of optional TCP/IP support. [d] Depending on Ethernet media. The EtherWay EL ($999) with an Apple Ethernet connection [f] Maximum five ports total. [g] Depending on hardware platform limitations, such as number of NuBus slots. [h] Remote access over dial-up lines. [i] Convertible to other media type through

offers very little background or reference material for the novice installer. (Webster says a simpler, non-HyperCard version of the installation software is on the way.)

In any network with several routers, the art of designating seed routers borders on divination. Designate a router with conflicting network numbers, and you set a time bomb ticking. Yet if you don't use seed routers, you wind up manually configuring every router on the network. To simplify installation, the GatorBox CS, InterRoute/5, and Shiva FastPath 5 each offer a *soft seed*, or autodiscovery, option: the router first attempts to find a seed router, then tries to skim routing information from network traffic, falling back on default configurations (or those entered by the installer) as a last resort.

To ease the burden of upgrading the software that controls routers, most hardware routers also let users download software upgrades to special memory (either flash EPROM or nonvolatile RAM) built into the router.

Management Software

THE SOFTWARE INITIALLY USED TO configure a network is also often used to manage the router, keeping track of its traffic load and error rates for troubleshooting or reconfiguring the router. In the not-so-distant past, some hardware routers required users to connect a Mac directly through a serial line to monitor functions or change configurations (in fact, Webster's MultiPort Gateway still does). Today, most router vendors offer management software that works from any Mac connected to the network, allowing you to look at more than one router at a time. For example, APT's Internet Manager lets users access any ComTalk router on the network from a zone list. Transware, Farallon, and Shiva have taken the idea a step further with management applications that track their other products as well as their routers.

Most routers broadcast at least some information to general-purpose network-management applications based on the standard Simple Network Management Protocol (SNMP). The GatorBox CS even includes an SNMP-based application running over TCP/IP that you can use to configure and manage the router.

In theory, a router-management application based on SNMP could monitor and control any router on the network that offers SNMP support. Although it's now possible to run SNMP over AppleTalk, most router vendors have not yet upgraded their management software to do this. Until then, check out RouterCheck 2.03 from Neon Software ($895; 510/283-9771) if you have multiple routers. The software uses a mishmash of SNMP plus each router company's own protocols to locate, monitor, and control routers over the network.

Security

EVERY ROUTER EXCEPT THE STRIPPED-down Dayna PathFinder offers some password security or ability to hide parts of the network. Managers of sprawling AppleTalk networks will say that no router security in place today is enough. How much security you can really get out of a router, though, depends heavily on whether you are willing to use only one vendor's routers and how far a user is willing to go to circumvent your measures.

Hardware routers have the upper hand in providing password security. Hardware routers such as the GatorBox CS store passwords encrypted and in non-

		SOFTWARE ROUTERS		
Shiva Corporation	Webster Computer Corporation	Apple Computer	Farallon Computing	Novell
FastPath 5	MultiPort Gateway	Apple Internet Router 3.0	Liaison Internet Router	NetWare Multi-Protocol Router 2.0
●	●	●	●	●
$1999 [e]	$2100	$499–$998 [c]	$395	$995
1	4	2	2 [f]	4
1	1	6 [g]	5 [f,g]	16 [g]
○	○	○	●	○
●	●	●	○	○
○	○	○	○	○
●	●	●	●	●
●	○	○	○	●
○	●	NA	NA	NA
●	●	●	○	●
●	●	○	○	○
●	●	● [c]	○	○
○	○	●	●	○
AppleTalk, DECnet, TCP/IP	AppleTalk, DECnet, TCP/IP	AppleTalk, TCP/IP [c]	AppleTalk	AppleTalk, IPX, OSI, TCP/IP
●	●	NA	NA	NA
thick and thin, or 10baseT	thick or thin	NA	NA	NA
1 year	1 year	90 days [j]	1 year [j]	none
○	●	●	○	○
AppleLink, BBS, CompuServe, Internet	AppleLink, Internet	AppleLink, 8BS, CompuServe	America Online, AppleLink, 8BS, CompuServe, Internet	CompuServe
617/270-8300	408/954-8054	408/996-1010	510/814-5000	801/429-7000
800/458-3550	800/457-0903	800/795-1000	○	800/638-9273

thin, and 10BaseT Ethernet connections. It costs $1500 without TCP/IP support and $2000 with TCP/IP support. supports AppleTalk only. [e] TheFastPath 5R Dual ($3799) has two LocalTalk ports and two Ethernet ports. optional transceivers. [j] For media.

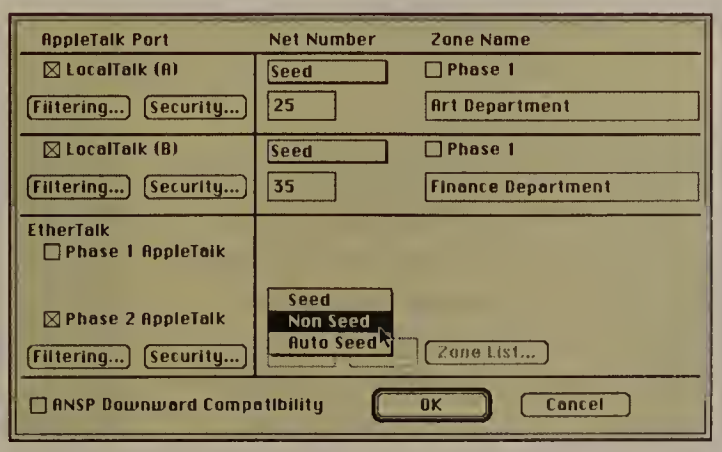
volatile memory so that saboteurs can't get in by simply restarting all the routers. The Apple Internet Router and Liaison, both software routers, have you set passwords for the management applications. In the case of Liaison, a snoop need only erase a setup file to reset the password. The FastPath 5 allows administrators to set a password for each FastPath 5 router and a master password that keeps users from accessing the management application (Shiva encrypts the passwords in memory). For really sophisticated security, the NetWare MultiProtocol Router wins hands down. It uses NetWare's 3.11 server security, which encrypts passwords on the wire and lets you set differing levels of access for different users.

But perhaps the most valuable security features routers offer today have less to do with barring mischief than with efficient use of resources. The ability to hide devices on the network lets you limit how much other network users can see and thus use. These features can, not only prevent students from printing threatening letters on the dean's LaserWriter but also prevent spurious traffic from flooding over long-distance links.

Most routers offer two types of device hiding: *tilde* and LaserWriter. Tilde hiding enables you to hide any network device from anyone outside of one physical network, or network number, simply by putting a tilde (~) in front of the device's Chooser name. LaserWriter hiding does not require a tilde and is implemented a little differently across routers. For example, Webster's MultiPort Gateway hides only LaserWriters and hides them by zone, but not by network number.

Network and zone hiding suffer the same odd variations. For example, the GatorBox CS lets you hide network numbers only for the purpose of *tunneling*, a process that lets AppleTalk network traffic use an intervening TCP/IP network as a channel between two remote Macintosh networks. The GatorBox CS also lets you restrict users from accessing or seeing any part of the network outside of their own zone. The ComTalk HX allows you to hide zones one at a time instead of imposing a total blackout.

The EtherRoute lets you lock devices into or out of a particular zone. It goes a step further with password protection—letting you set passwords for individual devices and classes of devices, like AppleShare servers or LaserWriter printers. These extra measures, however, are lost if users can get at the network in question through a non-EtherRoute router.



To Seed or Not to Seed Compatible Systems' EtherRoute interface provides an intuitive way to designate a seed or nonseed router. Throughout the software, pop-up menus make it easy to configure the router.

Tech Support

EVERY COMPANY EXCEPT NOVELL OFFERS at least some free direct technical support. Many, however, require you to pay for a toll call. If you call Novell directly, you will pay dearly, about $150 per question. Overall, we found technical support at the companies that we called to be reliable, friendly, and fast (we didn't call Apple and Novell). Dayna, however, suffered from inconsistent quality. One question, asking technicians to diagnose a disconnected network port, was not resolved after two calls; after that, the technician handling the problem simply stopped returning calls. A separate call to Dayna about configuring the router was answered by a knowledgeable and helpful technician.

Footprint

WHILE FOOTPRINT ISN'T A HUGE CONSIDERATION for someone with one or two routers, it can be crucial if you have 20 or 30 competing for space in wiring closets. Software routers aren't very space-effective because they have to be installed on a Mac (or a PC in the case of Novell), which takes up a lot of space and can't be wall- or rack-mounted. While hardware routers vary in shape, they can usually be stacked or mounted on a wall. Cayman's odd-shaped stand-alone box is an exception. While easy on the eye, its monolith-atop-a-pedestal shape could prove difficult to squire into a wiring closet.

But if you already have a concentrator or rack-mount system and want to add a router, several vendors, including Cay-

man, offer versions of their routers that plug into these. Cayman's GatorMIM CS ($2795) is available for Cabletron Systems' Multimedia Access Center (MMAC) hubs, and the GatorBox CS/Rack ($2995) fits in any standard 19-inch rack. Farallon sells the InterRoute/5 Concentrator Module ($3299) for its Farallon Concentrator. Shiva offers the FastPath 5R ($1999) for standard 19-inch racks.

TCP/IP Options

WANT TO USE A BIG TCP/IP NETWORK like Internet to hook up two networks on different sides of the nation? Do you need to communicate with Unix machines or other types of computers typically found on TCP/IP networks, or will you in the future? Then consider your TCP/IP options. Routers offer TCP/IP options in two basic flavors: gateways and wide-area connections.

Gateways let Macs equipped with the proper terminal-emulation software and TCP/IP protocol stack pretend to be dumb terminals and log on to Unix workstations, minicomputers, and mainframes on TCP/IP networks. Routers facilitate this charade by making it appear as if AppleTalk nodes have TCP/IP addresses.

For wide-area connections, tunneling is used to connect two AppleTalk networks through a TCP/IP network. Tunneling sends native AppleTalk traffic disguised as TCP/IP packets so that they can travel across the foreign network unmolested. The router on the receiving end strips off the TCP/IP wrapper, making the packet recognizable to the remote AppleTalk network. For instance, an AppleTalk workgroup in New York attached to one in San Francisco via a tunnel could print documents or launch applications on servers on the other coast. (Note: tunneling performance is determined by many factors—talk to router vendors about your network configuration before making purchases.) Whereas tunnels must be explicitly defined by the administrator, TCP/IP gateway functions are automatically invoked when an AppleTalk user sends a packet to a TCP/IP address and vice versa.

Most vendors implement gateways

MW LAB Can Your Router Keep Up?

THE TEST CONFIGURATIONS

Macworld Lab tested 11 routers both in a single-router configuration (with one router connecting a LocalTalk network to an Ethernet network) and in a backbone configuration (with two identical routers, each connecting a LocalTalk network to an Ethernet backbone). Four Macintosh IIci's set up as AppleShare 3.01 servers resided on one LocalTalk network, and four other IIci's configured as AppleShare clients resided on either an Ethernet network (single-router test) or another LocalTalk network (backbone test). All of the Macs had 8MB of RAM. For the software routers, Farallon's Liaison Internet Router and the Apple Internet Router each were tested on a dedicated IIci, and Novell's NetWare MultiProtocol Router was tested on a Compaq DeskPro 4/25i, a 25MHz 486SX. Remember that software router performance depends on the hardware platform.

We paired each server with one client, to ensure that any measured bottlenecks were the result of network and router performance, not server performance. We transferred a 1MB file from a server to its client ten times; performing the file transfers first with one client-server pair, then with two pairs, then three, and finally four, all communicating simultaneously.

SINGLE-ROUTER TEST CONFIGURATION



BACKBONE TEST CONFIGURATION



THE RESULTS

Note just how similarly most of the routers perform, especially in the single-router test. In the single-router test, APT's ComTalk HX turned in the best time under the heaviest loads, and its performance degraded the least between one and four pairs. For the backbone test, Farallon's InterRoute/5—the second-place finisher in the single-router test—performed the fastest under all loads, with ComTalk HX running a close second. Webster's MultiPort Gateway and Shiva's FastPath 5 also performed well in the backbone test; the GatorBox CS and Compatible Systems' EtherRoute were the slowest.

Times are in seconds. Shorter bars are better.

Number of client-server pairs communicating simultaneously



	SINGLE-ROUTER TEST				BACKBONE TEST			
Hardware Routers								
APT ComTalk HX	59.2	93.3	127.0	169.3	66.1	113.8	140.9	179.3
Cayman GatorBox CS	57.6	103.9	154.4	204.5	103.9	180.1	240.0	302.2
Compatible Systems EtherRoute	60.6	107.5	148.3	190.0	80.6	152.4	219.7	291.1
Dayna PathFinder	57.8	100.6	146.6	197.2	72.8	118.9	157.3	203.7
Farallon InterRoute/5	55.0	92.5	138.4	179.3	64.9	107.3	140.5	177.6
International Transware EtherWay	54.7	93.1	133.2	180.1	66.9	166.3	210.8	270.2
Shiva FastPath 5	57.1	99.9	139.4	181.8	67.7	108.6	144.4	184.9
Webster MultiPort Gateway	59.7	101.6	141.6	187.5	67.2	108.8	146.9	186.6
Software Routers [1]								
Apple Internet Router [2]	55.1	95.8	142.3	186.7	65.1	130.3	184.2	243.7
Farallon Liaison Internet Router [2]	55.5	95.2	138.1	184.6	74.4	130.8	181.1	248.5
Novell NetWare MultiProtocol router [3]	57.7	99.2	145.1	191.2	75.7	155.4	211.9	273.3

[1] Software router performance depends on the hardware platform. [2] Tested on a Mac IIci. [3] Tested on a Compaq DeskPro 4/25i (25MHz 486SX).

similarly through public-domain methods. But tunneling works differently among different routers. That's part of the reason why Apple is trying to convince all vendors to use a wide-area protocol it's developed, called AURP (Apple Update Routing Protocol). While Apple uses AURP to establish tunnels, most other routers use the older tunneling method developed by Cayman.

If you plan to use tunneling, choose two routers you know use the same method, preferably from the same vendor, or you may find your plans for a coast-to-coast Mac network dashed.

For advanced TCP/IP networking, only the GatorBox CS offers a Network File System (NFS) server add-on. The optional software lets Macintosh users log on to and use a Unix-based NFS server as if it were an AppleShare server.

Price

MACINTOSH ROUTERS BREAK INTO three price categories: standard hardware routers ($1500 to $3500), which offer a full feature set and several configuration options; bargain hardware routers (under $1500), which tend to be either basic models or from newer companies eager to compete in the market; and software routers (all under $1000).

If you compare each class feature-by-feature, you'll find that some bargain-price routers are comparable to the standard choices. Their interfaces may not be as slick, and their implementations not as polished in one area or another, but if you are willing to put up with this and to settle for often skimpy documentation, bargain routers may be the thing for you. Bear in mind that cheaper isn't always better. The PathFinder is cheapest at $899, but for $100 more, you get more security and management over the network with the EtherWay. The EtherWay's only concession to frills is an automatic default configuration that lets users plug and play in a one-router network.

You may want to buy a tried-and-true standby, like Cayman's GatorBox CS, for a number of reasons, including installed base, stability, and integration. The InterRoute/5, for example, is designed to slip in easily and manage well in a network made up of Farallon's line of Star Controller hubs, boards, and cabling.

When it comes to routers, be sure you aren't paying for things you don't want, and be willing to pay for the things you need or will need soon. Although Apple and Compatible Systems sell TCP/IP options separately from their routers, many routers, like the GatorBox CS, come with built-in support. If you need TCP/IP support, make sure that you factor in the cost of add-ons.

If you need room for future expansion (and most networks do grow), consider paying for a multiport router, like the ComTalk HX or InterRoute/5, or using a software router. With software routers, to add a port you just buy a network interface board (presuming the computer you run the router on has a free expansion slot). The three software routers we reviewed support from five or more networks. Keep in mind, however, that you'll need a CPU powerful enough to keep the router from bogging down under these loads. Software routers also give you the flexibility of upgrading your hardware, and the computer formerly dedicated to routing can be recycled as a communications server or mail server, unlike a single-purpose hardware router.

Remote Access

MAC-BASED SOFTWARE ROUTERS CAN BE a great deal for small networks and cheapskates because they are inexpensive, make use of existing resources, and are easy to use. But the one really big advantage they offer over hardware routers is a feature called *half-routing*, which lets you link two remote AppleTalk networks over regular phone lines using modems. Half-routing is especially useful when you can't justify the cost of a full-time connection between two network sites, since you only pay phone charges when the networks are actually connected. Farallon's Liaison lets you choose whether to connect only at certain times of day or on demand. Liaison also lets users dial into the network from home or on the road using a small client, called LiaisonNet, that comes free with the router.

When the remote Mac connects, it looks and acts like a local node on a zone in that router's network. The Apple Internet Router supports half-routing, between networks, but unlike Liaison won't support a single user on the road dialing into the network. Apple sells a separate product, AppleTalk Remote Access ($199), for that purpose.

A Router Right for You

THERE'S A ROUTER FOR EVERYONE. Depending on how much money you want to spend and whether you value speed, features, or another mix of variables, you can find a balance of what's right for you. After evaluating 11 routers, we couldn't pick just one, so the Editors' Choice selections—Farallon's InterRoute/5, Compatible's EtherRoute, and Apple's Apple Internet Router 3.0—reflect what we think is the best value in each of the three price categories. Still, you may find that your needs cross categories. If you want to trade off a little speed and a couple of ports for more TCP/IP support or a board that fits in a Cabletron hub, the GatorBox CS could be good for you. Got a big installed base of FastPaths? Then maybe the FastPath 5 is what you need. More concerned about speed than security? Then the ComTalk HX might be a better choice than the EtherRoute for you. If you are more interested in half-routing than local routing, the Liaison offers more options than Apple's Internet Router, not to mention a free dial-in client. And if you work in an environment more dominated by NetWare than Macintoshes, or if you just like the thought of running a router on a powerful, cheap PC, by all means, buy the NetWare MultiProtocol Router.

Whatever your choice, you'll find routing a little less prickly than it was just a couple of years ago. **m**

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Macworld Lab testing supervised by MATTHEW CLARK.

MW EDITORS' CHOICE

Hardware Router ($1500 to $3500)

InterRoute/5 The InterRoute/5 offers a balanced mix of good routing speeds with easy installation, well-thought-out documentation, and excellent management software. Attention to integration with existing networks and support for four LocalTalk ports make the InterRoute/5 our pick in this class. **Company:** Farallon Computing. **List price:** $3299–$3499.

Hardware Router (under $1500)

EtherRoute Multilevel security options and two LocalTalk ports make the EtherRoute a superior value for simple LocalTalk-to-Ethernet configurations in this category. **Company:** Compatible Systems. **List price:** $1495 base model (no TCP/IP support).

Software Router

Apple Internet Router 3.0 An optional $499 TCP/IP support module, support for tunneling through TCP/IP networks, and straightforward installation set the Apple Internet Router 3.0 above other software routers. **Company:** Apple Computer. **List price:** Basic Connectivity Package $499.

BOSSES WITH X-RAY EYES

Your employer may be using computers to keep tabs on you

BY CHARLES PILLER

Each and every day, Gayle Grant and her colleagues were electronically monitored down to the second as they did their jobs. Unplugging themselves from their job monitors could lead to dismissal. "We punch in and out of three units: the time clock, the VDT [computer terminal], and the telephone keypad known as Collins. We plug a phone jack into Collins that is attached to our headset and [we] receive telephone calls. The VDT and Collins track every second of our day," says Grant (a pseudonym), an airline reservations agent in California. She and her colleagues were allowed 11 seconds between calls and 12 minutes of personal breaks daily. Two episodes of unauthorized unplugged time in a week were cause for disciplinary action. She eventually cracked under the pressure. Grant suffered a nervous breakdown.

Grant's reaction may have been extreme, but her employer merely followed standard practice in many industries, and acted consistently with both the letter and intent of U.S. federal law. The 1986 Electronic Communications Privacy Act (ECPA) prohibits phone and data-line taps with two exceptions: law-enforcement agencies and employers.

The police or FBI can tap lines—but only as a last resort under court order—to crack criminal conspirators, drug traffickers, and other serious-crime suspects. The courts permit fewer than 1000 such taps each year, nationwide.

Employers have no such limits. They may view employees on closed-circuit TV; tap their phones, E-mail, and network communications; and rummage through their computer files with or without employee knowledge or consent—24 hours a day.

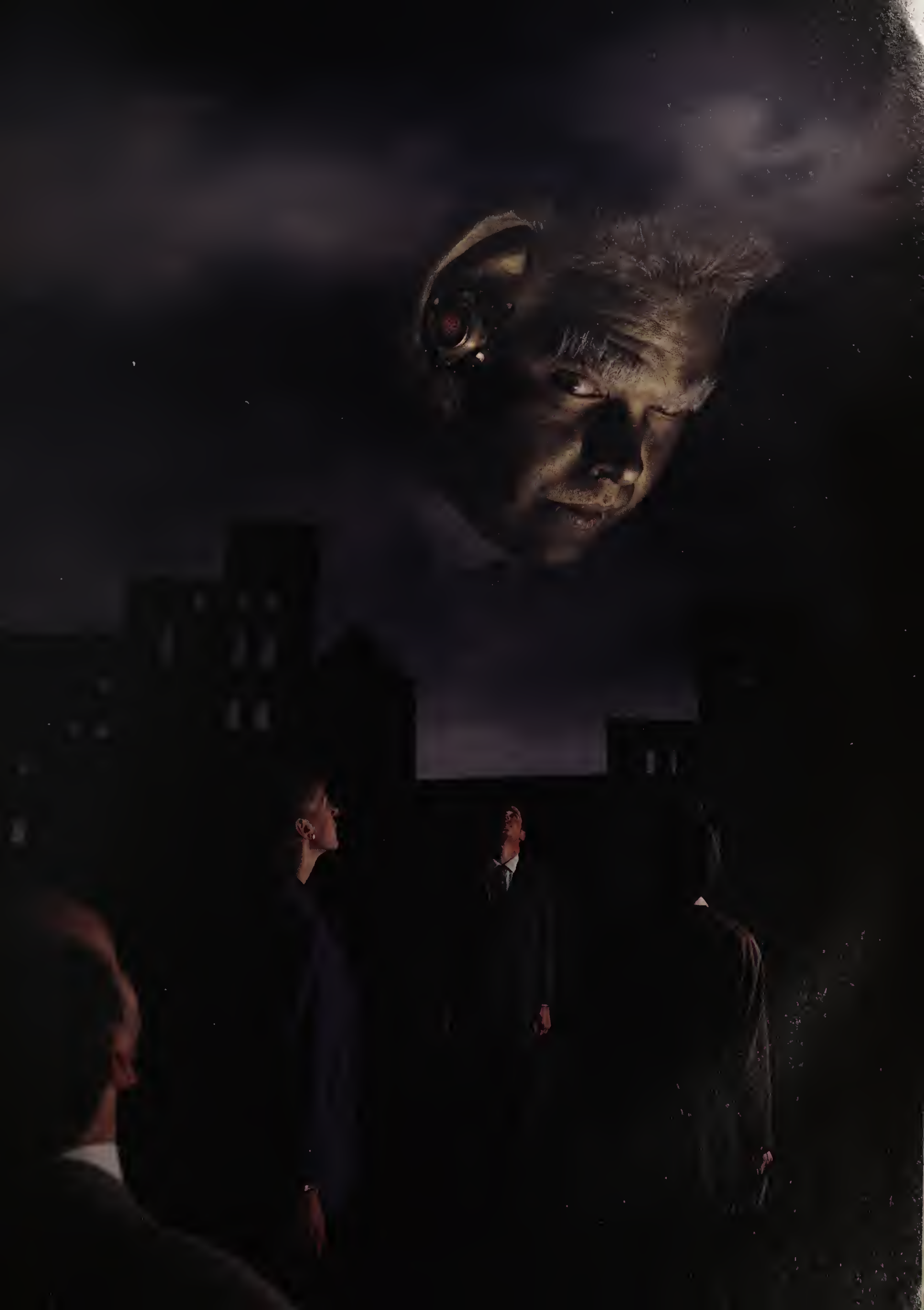
The most pervasive use of monitoring takes place in occupations where tasks are highly repetitive, so productivity can be easily measured. The Communications Workers of America, the union that represents most telecommunications workers, estimates that employers eavesdrop on phone calls between workers and consumers 400 million times per year—more than 750 calls every minute. Mail sorters, word processors, data entry clerks, insurance adjusters, and even computer tech-support specialists, often working on terminals connected to a mainframe, may be monitored constantly or intermittently for speed, errors, and time spent working.

Working in Glass Offices

MOST PROFESSIONAL AND TECHNICAL EMPLOYEES assume that they have nothing to fear. Their privacy is protected by the nature of their jobs—too complex to evaluate by machine, right? To test that assumption, *Macworld* examined 25 popular network-management, integrated groupware, electronic-mail, and remote-access products to see if they could be used to invade employee privacy, and if so, how easily. The study used only Macintosh software, but similar tools are available on other platforms.

If your office network runs on a full-featured network operating system, like Novell NetWare or Microsoft LAN Manager, and is run by a technically astute manager, then your Macintosh and all data transferred from it is an open book. Working from an office across the room or across the country, a network manager—particularly in server-based local area networks—can eavesdrop on virtually every aspect of your networked computing environment with or without your approval or even knowledge. The manager can view the contents of data files and electronic-mail messages, overwrite private pass-

MICHELE CLEMENT



Job Seeker Beware: Electronic Hurdles to Employment

Ross Perot's eager campaign volunteers were stunned last year when they discovered that agents of the billionaire politician may have looked into some of their backgrounds. The news stimulated an FBI probe into allegations that the Perot campaign organization illegally obtained volunteers' confidential credit reports. The allegations made Perot seem paranoid and sleazy. Actually, he may just have been following the standard practice of many prudent managers, who have become some of the biggest users of electronic tools to investigate job seekers or recent hires.



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Tom O'Neil, a New Jersey business consultant and onetime chairperson of the Perot campaign in his state, claims he was confronted by representatives of Perot's Dallas headquarters who had obtained error-ridden versions of his personal data.

These managers verify prior-employment claims carefully, of course. Nothing new there. Then they check credit and criminal records online in a matter of minutes. If data is not available in electronic form—for example, college transcripts—they hire research services to get transcripts and deliver their contents to the client's online account in a day or so.

These efforts fit right into a corporate culture that leads a growing number of employers to require drug tests and, leaving nothing to chance, so-called personality profiles. Such profiles may contain hundreds of true-false questions, such as these typical examples: "I have read little or none of the Bible," "My sex life is satisfactory," and "I am very seldom troubled by constipation." They may be used to predict laziness, poor work habits, or psychological problems, or merely to verify whether the job seeker has mainstream values or an outlook consistent with company goals.

"Management is very pragmatic," says Alan F. Westin, a professor at Columbia University who is an expert on electronic privacy issues and an industry consultant. "Management will do whatever the social system and the legal system says, with a special emphasis on whether it helps get the work done to make a better product."

This pragmatic approach derives, in part, from skyrocketing health-insurance and legal bills. The cost of medical care has led many employers to screen out applicants who smoke or are overweight.

And until last summer, many employers searched online data banks to find out whether a job seeker had ever filed a workers'-compensation claim—an insurance claim for an on-the-job injury. Some employers refused to offer a job to anyone who had ever filed a comp claim. The Americans With Disabilities Act, signed into law last year, limits the use of such data banks before a firm offer of employment has been made. But if an employer finds a history of compensation claims after making a job offer, the employer can shift the prospective employee to a job classification that reduces risk of reinjury. If in the employer's opinion no appropriately safe job is available, the offer can be rescinded.

And a rash of lawsuits in the 1980s accusing employers of "negligent hiring" has also pushed employer vigilance to a new standard. You hire a man to do maintenance at your hotel, giving him a passkey to all the rooms, of course. That man rapes a guest. Because you failed to check his criminal history online, you didn't know that he served time for assault six years earlier. Welcome to court. Employers are caught in a dilemma, says Westin. "Do they stay with the hands-off, respect-the-privacy, that's-not-our-business view, or do they respond to their lawyers' warnings to protect themselves against liability, and their bean-counters' warnings that health-benefit costs are going to be out of sight?"

Employers have a responsibility to protect themselves from potential liability and their customers from undue danger. But privacy advocates ask whether society is well served by a business culture that can blacklist people with the cool efficiency of a 9600-bps modem.

words, and audit your time and activities on the network.

All the major electronic-mail and groupware products that combine messaging, file management, and scheduling (such as WordPerfect Office) allow the network administrator to change passwords at any time, then read, delete, or alter any messages on the server. With few exceptions, network-monitor programs, such as AG Group's LocalPeek, Farallon Computing's Traffic Watch II, and Neon Software's NetMinder, allow astute managers to read files transmitted over the net. In short, these tools are only slightly less invasive than others specifically designed for surveillance and used primarily on mainframe systems.

They Like to Watch

NETWORK ADMINISTRATION AND COMmunication tools were designed for valid reasons, not to invade employees' privacy. Like any technology, they are value-neutral. Some vendors even include strongly worded privacy warnings and a few offer options that allow a client Mac to shut out network managers.

The capacity to snoop is there, but is it used? Old surveys and anecdotal accounts suggest that in some industries—telecommunications, insurance, and banking, for example—as many as 80 percent of employees are the subjects of telephone or computer-based monitoring. Such estimates may be inflated, but there is little dispute that many employers monitor routinely. And if the rapid sales and market growth of snooping tools is an indication, monitoring is on the rise. But virtually no rigorous research has been done about how much electronic eavesdropping takes place on the job.

Until now. *Macworld* conducted a survey of CEOs and MIS directors at 301 large, medium, and small businesses in a wide range of industries to find out how much they peek at their employees' work on their computers, and why (see the "Electronic Eavesdropping at Work" charts). About 22 percent of our sample have engaged in searches of employee computer files, voice mail, electronic mail, or other networking communications. In companies with 1000 or more employees, the figure rises to 30 percent. Nearly 16 percent of respondents report that they have checked employees' computerized work files.

The average company in our study employs 3240 people, so the total sample represents the conditions experienced by nearly 1 million workers. This data suggests that some 20 million Americans may be subject to electronic monitoring through their computers (not including telephones) on the job. Meanwhile, only 18 percent of respondents' companies have a written policy regarding electronic privacy for employees.

Managers who endorse electronic surveillance argue that it helps them gauge productivity and chart the work flow of a group of employees. It can generate statistics on individual or departmental accomplishments and plot future work loads. Computer monitoring can even be used to give employees managerial feedback and reduce the need for personal attention from supervisors. In the



MANUELLO PAGANELLI

Privacy advocate Marc Rotenberg: Contrary to what many people believe, "E-mail is more like a postcard than a sealed letter."



MANUELLO PAGANELLI

Senator Paul Simon: "Employees should not be forced to give up their freedom, dignity, or sacrifice their health when they go to work."



VIRGINIA LIBERATORE

Privacy expert Alan F. Westin: "Monitoring that creates feelings of surveillance and stress is antithetical to the new cultures of management."

Macworld survey, 12 percent of responding employers endorse monitoring for evaluating performance or productivity.

Monitoring can also increase safety or adherence to company rules, some employers contend. Some trucking companies, for example, set on-board monitors to record speed, engine-idling time, and length of stops. The system ostensibly tries to ensure that truckers drive safely and take adequate rest breaks.

Companies that deal in sensitive data may feel compelled to guard against disloyal or merely careless employees who might divulge it to competitors (see the sidebar "To Catch a Spy: Is Workplace E-Mail Private?"). And 4 percent of our survey respondents endorse electronic monitoring "for routinely verifying employee honesty." A much higher number—23 percent—feel electronic monitoring is a good tool where reasonable evidence of wrongdoing, such as theft or negligence, comes to light.

While nearly half of the managers in our survey endorse the concept of electronic monitoring, and nearly a fourth actually conduct electronic monitoring, most of those don't do it often. About 71 percent of those who conducted such searches did so only five or fewer times in the preceding two years. Only two companies had searched employees' work files, voice mail, electronic mail, or networking communications more than 100 times during that period.

A Model Employment-Privacy Policy

Macworld's privacy survey suggests that less than one-fifth of U.S. employers have electronic privacy policies. So in most cases, employees may have no idea whether or how employers monitor their everyday activities and work files. The following points represent what many privacy advocates consider basic features for a good electronic-privacy policy for employers:

- Employees are entitled to reasonable expectations of personal privacy on the job.
- Employees know what electronic surveillance tools are used, and how management uses the collected data.
- Management uses electronic monitoring or searches of data files, network communications, or electronic mail to the minimum extent possible. Continuous monitoring is not permitted.
- Employees participate in decisions about how and when electronic monitoring or searches take place.
- Data is gathered and used only for clearly defined work-related purposes.
- Management will not engage in secret monitoring or searches, except when credible evidence of criminal activity or other serious wrongdoing comes to light.
- Monitoring data will not be the sole factor in evaluating employee performance.
- Employees can inspect, challenge, and correct electronic records kept on their activities or files captured through electronic means.
- Records no longer relevant to the purposes they were collected for will be destroyed.
- Monitoring data that identifies individual employees will not be released to any third party, except to comply with legal requirements.
- Employees or prospective employees cannot waive privacy rights.
- Managers who violate these privacy principles are subject to discipline or termination.

From Watching to Intruding

THE *MACWORLD* SURVEY INDICATES THAT many employers may recognize that excessive monitoring has possible negative side effects. "Technology now allows employers to cross the line from monitoring the work to monitoring the worker," Cindia Cameron, a field organizer for 9 to 5, National Association of Working Women, told a Senate committee. She cites the case of an express-mail company employee whose computer logs the length and frequency of her trips to the bathroom. The woman was reprimanded for using the bathroom four times in a single day.

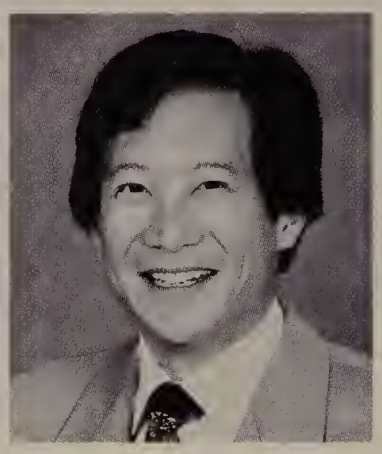
Some employers use monitoring data in efforts to boost productivity through competition—by posting data publicly. One enterprising Florida company, Thomas Powell Associates, found a way to automate the process. "I got the idea watching the [Miami] Dolphins [football team]," says a company founder. "Those athletes play their hearts out. Why? Certainly the money helps, but it's not the real reason. They play at 100 percent because everything they do is seen by hundreds of thousands of people—instantly." The company produces and sells software that instantaneously puts every telephone operator or telemarketer's productivity statistics on a computer screen, visible to all employees.

Do such schemes pay off? "Monitoring that creates feelings of surveillance and stress is antithetical to the new cultures of management that our society is moving toward," says Alan F. Westin, a professor at Columbia University and consultant to the data-gathering giant Equifax. Westin practically invented the idea of "electronic privacy" and has written on the subject for three decades. "[If management] doesn't motivate employ-

To Catch a Spy: Is Workplace E-Mail Private?

Most people believe that electronic-mail messages are secured by a personal password—as private as a letter in the U.S. mail. "They are finding out," says Marc Rotenberg, Washington, D.C., director of Computer Professionals for Social Responsibility, "that E-mail is more like a postcard than a sealed letter."

Test case for privacy Employers have ready means to read E-mail messages, and many do just that, as computer executive Eugene Wang found out recently. His case, involving two Silicon Valley companies, could break new ground in electronic-privacy law.



Symantec's Eugene Wang, who stands accused of theft of trade secrets, is at the center of a bitter debate over the privacy of commercial E-mail services that are used for company business.

Wang, who was Borland International's vice president for computer languages, defected to a direct competitor, Symantec Corporation, last September. Court documents filed by Borland attorneys state that shortly after Wang announced his departure, Borland execs found E-mail addressed from Wang to Symantec CEO Gordon Eubanks. The messages allegedly revealed top-secret corporate data, including marketing plans, product-release dates, and detailed information on Borland's game plan against Symantec. The police and FBI were called in shortly thereafter, and seized other documents at Eubanks' and Wang's homes.

Because Wang used MCI Mail—a commercial E-mail service—allegedly to transfer data to Eubanks, electronic privacy has become a key issue in the case. Wang and Eubanks, who have been indicted on criminal felony charges involving theft of trade secrets, deny that they violated trade secrecy laws. They also argue that when Borland viewed Wang's MCI Mail messages, the company may have violated federal law. If so, the confiscated E-mail messages might not be admissible in court. The 1986 Electronic Communications Privacy Act (ECPA) protects messages sent on commercial E-mail, such as MCI Mail, from outside or unauthorized users. "Even if Borland had gathered evidence in a legitimate and legal way regarding privacy, [Eubanks and Wang] would still be innocent," says Symantec attorney James McManis. "But if after reviewing all the data, it appears to us that there has been a violation of the (ECPA) statute, we will raise that."

Borland counters that it paid for Wang's MCI Mail account, and therefore had every right to inspect the messages. "New employees at Borland are given an MCI [Mail] password that is on file with a Borland administrator," says Borland spokesperson Steve Grady. "You do not have a reasonable expectation of privacy in an E-mail system that is given to you for company business by your employer." If the privacy issue is litigated, it could set new standards on the privacy of commercial E-mail.

California challenges Federal rules regarding in-house electronic mail are less ambiguous than those governing commercial E-mail. ECPA treats internal company communications as company property. And a *Macworld* survey suggests that some 375,000 employers agree. About 9 percent of respondents—CEOs and MIS directors of U.S. companies of all sizes—indicate that they sometimes search employee E-mail files. This prerogative is being challenged in California, where the state constitution specifically protects privacy, unlike the U.S. Constitution. Court documents indicate that Alana Shoars, formerly E-mail director of Epson America, claims she was fired in 1990 for questioning her boss's right to read hundreds of E-mail messages sent between other employees. Shoars filed wrongful-termination and class-action lawsuits against Epson. Her attorney, Noel Shipman, claims that by reading employee E-mail messages, Epson violated both the state constitution's privacy provision as well as a California eavesdropping statute.

Shipman also represents two employees of Nissan Motor Corporation embroiled in an E-mail controversy. Rhonda Hall and Bonita Bourke were allegedly fired from their jobs installing software and training other employees. A legal brief filed by Shipman claims that the two were fired or forced to resign after complaining about managers printing and reviewing printouts of personal messages from the company's E-mail system—messages they assumed were private. The two sued for invasion of privacy and wrongful termination.

Both the Nissan and Epson cases were dismissed by lower courts, but are now on appeal. If the plaintiffs prevail in either situation, the legal status of personal E-mail messages on internal company systems will be thrown open, perhaps resulting in greater privacy rights.

ees to be more participative, to be more committed to the workplace, then the chances of producing the kind of quality work that will compete with the Japanese and the Germans are very low."

And managers concerned with both productivity and containing health-insurance costs may find electronic monitoring to be self-defeating. Electronic monitoring increases employee "boredom, tension, anxiety, depression, anger, and fatigue," according to a recent study of 745 employees of telecommunications companies, jointly conducted by researchers from the University of Wisconsin and the Communications Workers of America. These findings confirm earlier studies that implicate electronic monitoring as a major workplace stress factor—linked, in part, to the sense of powerlessness that monitored employees feel.

Possible Legislative Relief

SUCH CONCERNS HAVE STIMULATED some members of Congress to ask what constitutes fair and appropriate monitoring. The proposed Privacy for Consumers and Workers Act failed in the last Congress, but Capitol insiders have high hopes for it in this session. The proposed law would limit how monitoring could take place in these ways:

- Employers would have to tell new hires how they might be monitored and how the collected data would be used.
- Employers would be required to give advance warning that monitoring will take place (except for employees on probation)—possibly including a signal light or beep tone during monitoring.
- The total time that an employee could be monitored would be capped at two hours per week.
- Secret, periodic, or random monitoring of long-term employees would be prohibited.

Macworld's survey shows that the law would force policy changes for many businesses. We found that only 31 percent of companies that conduct electronic monitoring or searches of employee computers, voice mail, electronic mail, or networking communications give employees advance warning.

Many companies recognize consumer demand for privacy protections, and they have stepped forward with pioneering consumer-privacy policies that go far beyond the limited legal requirements. But few companies have policies in place that go as far to protect employee privacy as the Privacy for Consumers and Workers Act would mandate.

Companies that have led the way on consumer-privacy concerns, such as American Express, Citibank, and Equifax,

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describe their electronic monitoring of employees as strictly limited. But they would not release internal policies on employee privacy, and they acknowledged surveillance practices beyond what would be allowed by some features of the congressional proposal.

One reason that employers may give less weight to employee privacy is that they feel countervailing pressure: legal requirements to monitor or audit employee activities, particularly in information-intensive industries. So most employers comply with employee-monitoring laws and regulations as they see fit, rather than breaking new ground by minimizing monitoring and using the least-invasive approach, says privacy expert Westin.

Industry groups also castigate the Privacy for Consumers and Workers Act. "An employer would be put in the absurd position of having to advise suspected thieves when they are being observed," Vincent Ruffolo, president of Security Companies Organized for Legislative Action, told a Senate hearing.

If the proposal is enacted, says Lawrence Fineran of the National Association of Manufacturers (NAM), customer service will erode, and manufacturers might have to abandon certain kinds of computer-aided manufacturing. "NAM opposes any legislation that will interfere with the ability of modern and future equipment that can assist domestic companies in their fight to remain competitive," Fineran says. "Otherwise the United States may as well let the information age pass it by." Yet Japan and most of Europe already impose much tighter restrictions on employee surveillance than the U.S. proposal would mandate.

Few privacy advocates argue that monitoring should be eliminated. But they say industry ignores a critical factor: most employees are hardworking and honest. "The problem with the business community," says Louis Maltbe, director of the American Civil Liberties Union's Workers Rights Project, "is that they are trying to make the rules with the assumption that every employee is a goldbrick."

Maltbe and other advocates see reasonable privacy protection going far beyond the provisions of the proposed law, to the point where employees have some control over monitoring practices and data collected (see the sidebar "A Model Employment-Privacy Policy").

"There has been kind of a reflex reaction, automatically resisting things that ultimately have been very helpful to industry," says Senator Paul Simon, D-Ill., principal sponsor of the Senate version of the privacy bill. "The banking industry resisted having—believe it or not—federal insurance for banks. Now no bank would want to do without it," he adds. "Some companies are [giving prior notice of monitoring] right now and having no difficulties. I think it improves employee relationships," Simon says. In any case, he argues, "employees should not be forced to give up their freedom, dignity, or sacrifice their health when they go to work." m

Research assistance by JIM CARR.

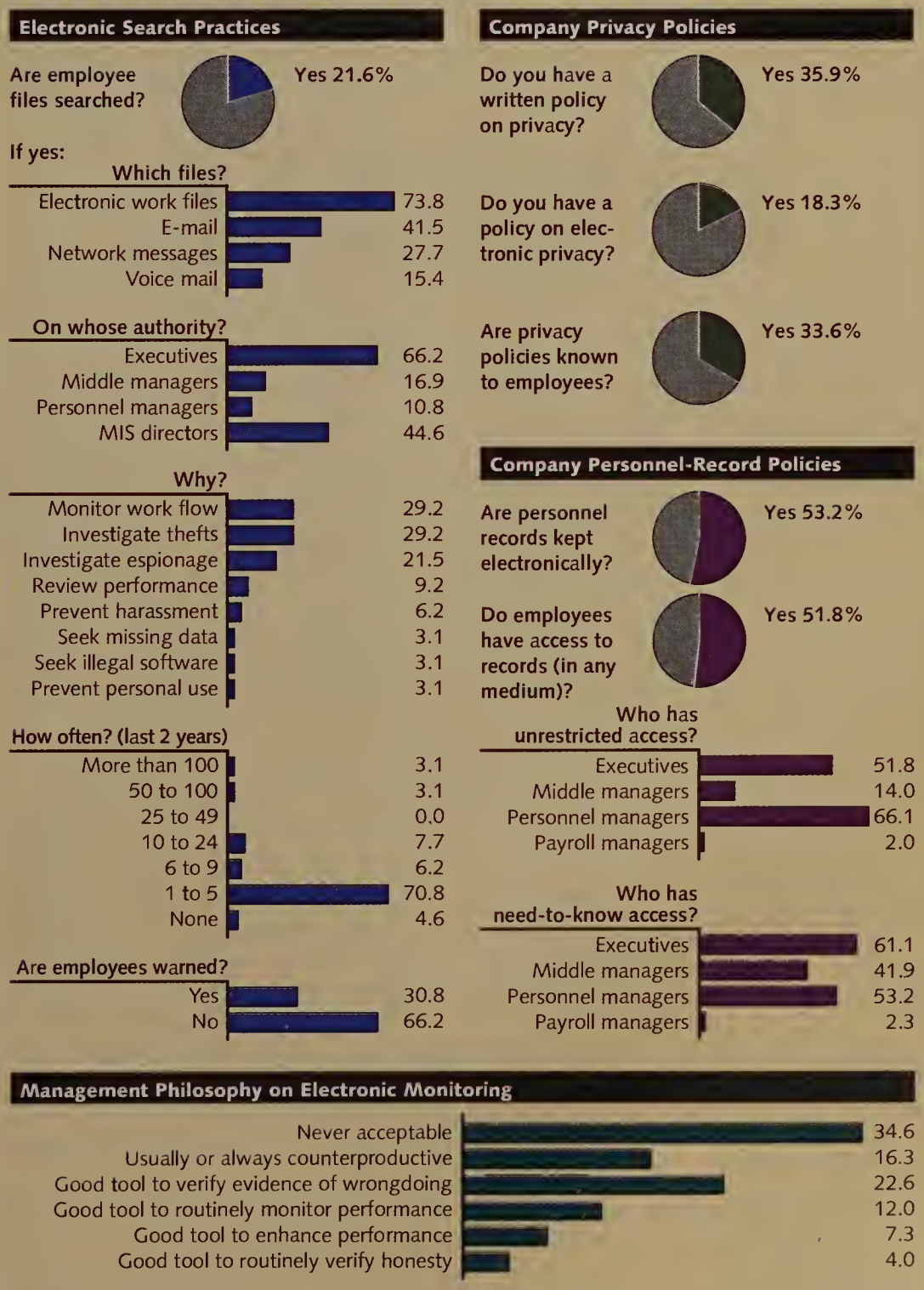
MACWORLD POLL

Electronic Eavesdropping at Work

Workers are routinely monitored in some industries, but how pervasive is the practice? To find out, *Macworld* conducted the first national survey designed to find out how and why businesses monitor employees. Top corporate managers from 301 businesses of all sizes and in a wide range of industries participated.

More than 21 percent of respondents—30 percent in large companies—have "engaged in searches of employee computer files, voice mail, electronic mail, or other networking communications." Nearly 16 percent report having checked computerized employee work files, and 9 percent having searched employee E-mail.

These data suggest that some 20 million Americans are subject to electronic monitoring. Is your hard drive or office network searched? Better ask your boss directly. Only 18 percent of respondents' companies had a written policy regarding electronic privacy. And only 31 percent of companies that conduct electronic monitoring or searches of employee computers, voice mail, E-mail, or networking communications give employees advance warning.



Totals may not equal 100 percent, due to non-responses or multiple responses.
Margin of error for responses is ± 2.9 percent.

PRIVACY IN PERIL

How computers are making private life a thing of the past

BY CHARLES PILLER

In recent years, gathering and sharing personal information has become a way of life for business and government. People have kept track of one another for millennia, of course. But the advent of telecommunications, the growth of centralized government, and the rise of massive credit and insurance industries that manage vast computerized databases have turned the modest records of an insular society into a bazaar of data available to nearly anyone for a price.

The U.S. Constitution carries no explicit guarantee of personal privacy. But most Americans consider the ability to conduct one's personal affairs relatively free from unwanted intrusions to be an inherent human right. A year-long *Macworld* investigation shows that such a right stands little chance against new electronic technologies that make most people's lives as clear as glass.

From a personal computer anywhere in the world, data can be gathered from limitlessly broad and diverse sources. The ability to capture, sort, and analyze that data is often nearly instantaneous. The force of such tools has overwhelmed the capacity of laws and social mores to protect privacy.

Until the last few years, if you wanted to find out, say, if anyone had sued Roger Heinen, the former Apple vice president who defected to Microsoft in January, you had to laboriously check, in person, at various county courthouses. I spent about two minutes doing the same thing online.

"As technology becomes ever more penetrating and intrusive, it becomes possible to gather information with laserlike specificity and spongelike absorbency," says Gary T. Marx, a privacy expert who teaches at the University of Colorado. "Information leakage becomes rampant; indeed, it is hemorrhaging. Barriers and boundaries—be they distance, darkness, time, walls, windows, even skin—that have been fundamental to our conceptions of privacy, liberty, and individuality give way. Actions, feelings, thoughts, acts, even futures are increasingly visible." Easy access has blurred the borders of private life.

The public views these developments with growing alarm. In a 1992 poll conducted by Louis Harris and Associates, 78 percent of Americans expressed concern about their personal privacy, up from about a third of those polled in 1970, and up from 64 percent in 1978. Perceived threats to personal privacy from computers rose from 38 percent in 1974 to 68 percent last year.

In a 1991 *Time*/CNN poll, 93 percent of respondents asserted that companies that sell personal data should be required to ask permission from individuals in advance. The 1990 census showed the highest rates of noncooperation ever—the result of fears that participation could place personal information in jeopardy, contend some privacy advocates. And California's Privacy Rights Clearinghouse—the first privacy hotline in the nation—logged more than 5400 calls within three months of its inception last November.

What They Have on You

PUBLIC CONCERNS HAVE RISEN IN TANDEM WITH the proliferation of personal records kept by government, corporations, and employers. New forms of data are coming online all the time. Nearly every quantifiable aspect of our lives—and many a judgment call—finds its way into data banks where it is exchanged, sold, and resold, again and again.

The sheer volume of available data is stunning. In 1990, the U.S. General Accounting Office, an arm of Congress, conducted a survey of federal data banks that contain health, financial, Social Security, and a wide range of other personal data. That incomplete tally included 910 major data banks with billions of individual records. Much of the information



A Model Consumer-Privacy Code

Feeling the sting of consumer anger at the deluge of direct-marketing solicitations and credit-report problems, many companies have voluntarily established privacy codes of conduct. The following model code combines high points from corporate and trade-association policies with the views of privacy advocates. This model is based on reasonable expectations for business practices in today's world. Therefore, it does not address three ideas that could prove critical to protecting privacy in the long term:

- An opt-in system for direct marketing, in which the personal data would be collected only on consumers who request that their names be placed on marketing lists.
- Mandatory updates, audits, and correction of public records data.
- The option to replace *credit* cards that leave an electronic trail for every consumer transaction with anonymous *debit* cards, as some nations now do (see photo below). But for now, the following measures would go a long way toward protecting consumer privacy in electronic transactions.

Data Collection

- Fully disclose to consumers the nature of the data collected.
- Collect only data necessary to your business purpose.
- Contact consumers yearly to disclose current and anticipated secondary uses of their personal data, and to offer an opt-out option.

Direct Marketing

- For small companies: Don't sell detailed personal data that can be tracked to specific individuals. Do require customers to certify that list data will not be resold.
- For large companies: Don't sell personal data at all. Instead, charge customers to distribute marketing materials relevant to their interests.

Data Accuracy

- Conduct systematic and regular audits to catch data entry errors.
- Disclose the source of data on request from individual consumers.
- Provide easy and free methods for consumers to challenge records that concern them and if needed, to correct those records.

Data Security

- Limit access to personal data on a "need to know" basis—available only for legitimate business purposes.
- Train employees to prevent unauthorized disclosure, and audit their compliance at regular intervals.

Credit and Medical Data Bureaus

- Provide free yearly *complete* reports to consumers.
- Create a speedy appeal process for consumers to challenge their data.

Sunset Provisions

- Follow all laws in expunging incriminating records such as criminal convictions or bankruptcies.
- Periodically check for and purge all obsolete data.



Phone debit cards, such as this one from France, work like computer transit tickets. Each call's cost is deducted from the prepaid card, obviating detailed billing records.

from these computerized systems is open to other government agencies and corporations, or sold to thousands of commercial data banks that trade on records about your home, possessions, stock transactions, family characteristics, and buying habits.

And once created, a record rarely disappears. "In our society, there is a tendency to collect data without a clear purpose. And it stays around for years," says Alan Brill, head of the information-security practice for Kroll Associates, the largest and most successful private-investigation firm in the country. "It's like vampire data. It rises up from the dead to bite you," he says.

Obsolete information can mislead. Out of context, a single incriminating element in someone's personal history can become a defining characteristic. Suppose you were guilty of possessing a small quantity of marijuana in 1985, but haven't taken a toke since 1986. Should that conviction affect your employment prospects in 1993?

The problems grow when the data is wrong. If data banks contain millions or billions of records, it's hardly surprising that they sometimes slip a digit or two.

Consider the Big Three credit bureaus—TRW, Equifax, and Trans Union—which are among the largest and most closely monitored purveyors of personal data. These agencies compile and sell the records of key economic transactions for a large majority of American consumers.

Early this year, TRW agreed to pay $1000 each to about 1200 residents of Norwich, Vermont, whom the company erroneously designated as deadbeats due to a coding error. A 1988 survey of 1500 credit reports found that 43 percent contained errors. And a 1991 survey by Consumers Union found errors in 48 percent of reports requested from the Big Three, including 19 percent with inaccuracies that could cause a denial of credit, such as a delinquent debt. The Federal Trade Commission receives more complaints about credit bureaus than about any other industry.

Errors are not always the fault of the credit bureau—it might be from one of its sources. "In many cases the [credit bureaus'] responsibility to their customers is to give an accurate reflection of what's in the public record, and that public record may itself be inaccurate," explains Steve Metalitz, general counsel of the Information Industries Association, which represents about 500 companies that gather and resell data.

Regardless of the origin of such errors, there are no clear lines of responsibility for correcting the record. Meanwhile, the victim's life may descend into a Kafka-esque nightmare.

Values in Conflict

THE NEW STANDARDS OF ELECTRONIC intrusion upset the balance between two distinctly American values: an open and accountable society, and the right to be left alone.

There are many reasons to keep public records open and easily accessible. Society has the responsibility, for example, to monitor illegal activities, to capture criminals, and to preserve public safety. If electronic privacy rights were absolute, we would never have learned about Oliver North's E-mail messages, which helped unravel the Iran-Contra scandal. And organized-crime kingpin John Gotti might never have been convicted but for the tap on his phone.

Yet data collection has a dark side. In the 1960s and 1970s, J. Edgar Hoover's FBI gathered personal data by any means possible and often used it to blackmail innocent people, sometimes destroying their lives.

Employers have a right to guard against ineptitude, criminality, and cor-



Trade association spokesman Steve Metalitz: "In many cases, the [credit bureaus'] responsibility is to give an accurate reflection of what's in the public record, and that record may itself be inaccurate."



Privacy advocate Evan Hendricks: "To me, junk mail is not the most burning privacy issue, but I can see it annoys the hell out of a lot of people." He receives hundreds of letters that prove the point.



PHOTOGRAPHS BY MANUELLO PAGANELLI

Information industry lawyer Ronald Plesser: "Is the use of information compatible with the purpose for which it was collected?" If not, misinterpretation or crass exploitation usually follows.

porate spies. But should employers be free to search at will any and all employee computer files, E-mail, voice-mail, and data transmissions over a company's local area network? (See "Bosses with X-Ray Eyes," in this issue.)

Government investigators, members of the press, and the public at large may have a legitimate interest, for example, in knowing whether U.S. Transportation Secretary Federico Peña has ever been tagged for drunk driving. (We have no reason to believe he has.) But when the driving records of millions of people are sold to mass marketers of automobile insurance or alcohol-treatment programs, has the public trust been violated?

Beyond Junk Mail

THE ISSUE TRANSCENDS ELECTRONIC-list sales and the invasive micro-marketing tactics they stimulate. Personal data itself has become a commodity for sale on the open electronic market to anyone who owns a personal computer.

Take the case of Marketplace: Households, an ill-fated joint venture of Lotus Development Corporation, a software developer, and the Equifax credit bureau. Marketplace would have placed the names, estimated incomes, purchasing habits, marital status, and other data on 120 million consumers on a CD-ROM—the nation on a disc for only $700. Few consumers were persuaded by the project's privacy protections. And they let it be known: 30,000 angry letters killed Marketplace. Shortly thereafter, in the face of mounting consumer pressure, Equifax agreed to quit selling *any* consumer credit data to direct-marketing vendors.

In the space of a year Equifax went from promoting one of the most far-reaching incursions into privacy ever contemplated to opting out of the credit-data marketing business altogether. Early this year, TRW (but not Trans Union) followed suit.

But the personal-information market hardly depends on Equifax or TRW. Thousands of other data resellers—*Macworld* among them—offer lists of likely buyers. This wealth of sources has spawned a sprawling information-reselling industry. The Burwell Directory of Information Brokers describes 1253 commercial services with names like Disclosure, Access Information, and Answer Associates.

Many of those services provide only data on companies, economic trends, or sociopolitical issues. But personal information—address, marital, salary, driving, and employment history; corporate affiliations; who your neighbors are; vehicle and real estate holdings; civil and criminal court records—and much of the rest of the trail of bytes left by all of us is now available from scores of commercial sources. And to make their lives easier, the data-hungry turn to supermarkets of online information.

Down in the Data Mines

SO-CALLED SUPERBUREAUS BUY ACCESS to the major credit bureaus, state and federal agencies, and just about any other private or public-record repository they can find. They provide one-stop shopping for online data. The data-reselling trade is the electronic equivalent of the gold rush—few legal restrictions apply, and there is lots of money to be made if you own the mine.

Standards vary widely, but some information brokers are less than scrupulous in screening their clients. Even legally shielded data, such as credit and phone records, as well as arrests that do not result in convictions, frequently are revealed to a wide range of qualified or merely determined and savvy requesters. These include private investigators, direct marketers, the press, FBI agents, lawyers, insurance companies, corporate spies, and vindictive ex-spouses.

The U.S. is a laughingstock among privacy experts because we protect video-tape-rental records, but not medical records

For data mining to be worthwhile, the information has to be difficult or impractical to obtain using conventional methods, but worth the cost of electronic extraction. It is.

Consider the results of an online experiment my colleague Galen Gruman and I conducted during research for this article. First we selected prominent individuals from the entertainment industry,

Shattering the Illusion of Privacy

THE GOAL

How easy is it to obtain someone's home address? Social Security number? Real estate holdings? *Macworld* investigated 18 business leaders, politicians, Hollywood celebrities, and sports figures. We primarily targeted residents of California, where most public records are online, and sought all legally accessible data available from four commercial and two governmental data suppliers. We exhausted the systems' resources after spending about $112 per subject. In addition to the records shown below, we searched public records for criminal court filings; fictitious business names; and records of bankruptcies, insider trading transactions, trusts, deeds, powers of attorney, and other legal matters.

THE SUBJECTS

In addition to the pictured subjects, we obtained similar data on U.S. Attorney General Janet Reno, U.S. Representative Robert K. Dornan, actor Clint Eastwood, Microsoft executive Roger Heinen, former U.S. Attorney General Edwin Meese III, restaurateur Wolfgang Puck, San Francisco Mayor Frank Jordan, and several others.



FROM LEFT TO RIGHT: GREG GORMAN/GAMMA LIAISON; ADAM SCULL/GLOBE PHOTOS; BRAD MARKEL/GAMMA LIAISON; WILL MOSGROVE; ED KASHI

WHAT WE FOUND

	George Lucas Movie producer	Joe Montana Football star	Leon Panetta Director, U.S. Office of Management/Budget	William R. Hearst III Publisher, *San Francisco Examiner*	Richard M. Rosenberg CEO, Bank of America
Personal Data					
Birth date	✓		✓	✓	✓
Home address	✓	✓	✓	✓	✓
Home phone	✓		✓		✓
Social Security number	✓		✓	✓	✓
Neighbors' address/phone	✓	✓	✓	✓	✓
Driver record*	✓		✓	✓	✓
Marriage record	✓	✓	✓	✓	
Voter registration				✓	✓
Biography	✓		✓	✓	✓
Legal/Financial Data					
Tax liens	✓			✓	
Campaign contributions**	✓		✓		✓
Vehicles owned			✓	✓	✓
Real estate owned	✓	✓	✓	✓	✓
Commercial loans/debts	✓	✓		✓	
Civil court filings	✓	✓	✓	✓	✓
Corporate ties***	✓	✓		✓	✓

**Includes physical characteristics. **$200 or greater contributions, federal offices only. ***CEO or registered agent of a corporation.*
Macworld does not guarantee the completeness or accuracy of the records we obtained.

business, politics, the Macintosh industry, and sports, including Hollywood producer (and friend of President Bill Clinton) Harry Thomason, former San Francisco 49ers quarterback Joe Montana, and Bank of America CEO Richard Rosenberg. Then we tried to find out everything we could on them, with the following restrictions: we did not seek legally protected data, and all the information had to be obtained online.

For this modest search we spent an average of only $112 and 75 minutes per subject. Even so, we unearthed the essential financial, legal, marital, and residential histories of nearly all of our subjects (see the chart "Shattering the Illusion of Privacy"). In short, we compiled electronic dossiers. And these were the efforts of data-mining neophytes.

As online services become increasingly interconnected, affordable, and fast, the ability to build electronic dossiers may quickly become the hottest privacy issue of the next century. Then again, there are so many pressing privacy issues and such widely divergent sensibilities about personal privacy, even professional privacy advocates have trouble deciding what's most important.

A Question of Priorities

"TO ME, JUNK MAIL IS NOT THE MOST burning privacy issue," says Evan Hendricks, editor of the *Privacy Times* newsletter. "But I can see it annoys the hell out of a lot of people." To illustrate the point, he pulled out a box of 300 recent letters from consumers apoplectic over a deluge of unwanted letters flowing into their mailboxes. Financial interests and personal sensibilities about electronic privacy cover an enormously broad spectrum. This makes it hard to separate trivial problems from real invasions that damage people.

"You have to choose a certain bundle of records, prioritize those records, and create a trustee situation around them," argues Jerry Berman, Washington, D.C., director of the Electronic Frontier Foundation, an advocacy group for computer users. "You cannot protect all data, bit by bit, byte by byte."

What should be in the bundle? Medical records are a top priority "due to the sensitivity of the data and the lack of any existing legislation to protect it," says Ronald Plesser, a lawyer who represents the information industry and headed President Clinton's transition team for the Federal Communications Commission. Tighter privacy controls for banking, tax, and credit records are also near the top of every privacy advocate's list.

"Around the world, the U.S. is a laughingstock among privacy experts because we have a law protecting videotape-rental records, but not medical records," Hendricks adds. (The release of individual video-rental records was sharply restricted after a reporter finagled the details of Judge Robert Bork's viewing habits during his confirmation hearings for a seat on the U.S. Supreme Court two years ago.)

Outcry over Credit Records

PUBLIC OUTCRY AND POLITICAL PRESsure have already reformed the major credit bureaus: all three bureaus now permit consumers to view and correct credit reports, although the reports released to consumers may not be as detailed as those given to, say, prospective employers or landlords. What's missing is usually information like an assessment of the person's credit risk.

TRW makes reports available free to individual consumers. Equifax has opened a toll-free line (800/685-1111) to respond to consumer questions. Bad publicity has prompted credit agencies—particularly Equifax—to more strictly screen companies and information brokers who seek access to credit reports. And in February, federal legislation was introduced that would force credit bureaus to correct errors within 30 days, and would hold banks and retailers accountable for the quality of the information they turn over to credit bureaus.

But credit records represent only a small fraction of online personal data. The far broader category of public-records data—real estate ownership, court records, tax liens, bankruptcy filings, voter registration data, auto and driver records, marriage records, and the like—should be on the table, argues Jan-Lori Goldman of the American Civil Liberties Union's Privacy Project.

"We're now asking a question that hasn't been asked before: What is the public's interest in accessing this information?" she says. Should the price of a driver's license be that you give up your detailed personal description to anyone who wants to buy it? Privacy advocates call for a close look at online data mining and they recommend limits on the collection of unduly detailed electronic dossiers.

Plesser, the Clinton transition team adviser, suggests using this test: "Is the use of the information compatible with the purpose for which it was collected?" When the answer is no, the prospect of misinterpretation or crass exploitation usually follows.

Do Access and Privacy Conflict?

MANY LAWYERS, DIRECT MARKETERS, and reporters say that radical restrictions on public-records data would give them electronic migraines, and could even make their jobs impossible. But Marc Rotenberg, Washington, D.C., director of Computer Professionals for Social Responsibility, warns against believing arguments that access and privacy rights are inherently incompatible. Such conflicts are often promoted by those who stand to profit by expanding access to private data, he argues.

Take the case of caller ID. Such systems instantly reveal a caller's number on a display attached to the phone of the party receiving the call. Caller ID has often been portrayed in the media as a simple case of competing consumer interests—some people advocate the system as a way to apprehend heavy breathers; others fear caller ID as an open invitation for businesses to surreptitiously pad marketing lists and for bullies to find battered spouses hiding in shelters.

But there is a third factor. "With the advent of caller ID, the telephone companies stood at the fulcrum of this information transfer and stood to benefit from the proposed sale of personal telephone numbers," Rotenberg says. How? They can charge businesses for using the caller ID service and then charge consumers for being listed or not listed, depending on the local laws' requirements.

Managing Electronic Privacy

HOW SHOULD SUCH CONFLICTS BE resolved? In the U.S., a wide range of federal and state agencies grapple with privacy issues. Sometimes they have exemplary tools to work with, such as the Electronic Communications Privacy Act, which bans most electronic eavesdropping over phone or data lines.

More often, there is little or no legal protection of personal data. Part of the reason may be that no government agency reviews privacy issues comprehensively or tries to map a coherent overall policy on the wide range of consumer, commercial, and workplace privacy issues.

Canada and many European nations use privacy commissions or data-protection agencies to advise their governments on privacy policy, protect consumer rights, or regulate corporations. Most privacy advocates in this country see some kind of privacy board—staffed with specialists equipped to evaluate emerging privacy issues—as a key to timely and effective regulation.

Our society collects and stores data without a clear purpose. It's like vampire data. It rises up from the dead to bite you.

"The U.S. is an embarrassment to the privacy movement overseas," says Simon Davies, director of the Australian Privacy Foundation. "The U.S. stands alone as an example of what a superpower should not do in privacy."

A U.S. data-protection board with advisory powers was proposed in Congress in 1991. Proponents believe that such a board could sort out the privacy implications of new services or technologies before they saturate the marketplace or are unnecessarily quashed by consumer outrage.

The developers of Lotus Marketplace might have averted years of fruitless development if a privacy board had offered feedback on the idea in advance. The National Research and Education Network (NREN), promoted by the Clinton administration, would be a prime candidate for advance evaluation by a privacy board. This multibillion-dollar "data superhighway" would theoretically allow tens of millions of Americans to communicate data, voice, video, and other forms of media at many times the speed of current networks. Protecting personal information on NREN is "*the* privacy issue of the twenty-first century," says the Elec-

11 Easy Ways to Safeguard Your Electronic Privacy

Other than a few hermits living on remote mountain peaks, few of us can realistically give up insurance, credit cards, and electronic banking. Sacrificing some personal privacy is the price of admission to our consumer society. But the following steps can curb some of the worst invasions of privacy in the lives of today's consumers.

Personal Identification

• Give only the minimum data required for commercial transactions. Leave all Social Security, home phone, driver's license, and credit card numbers off checks whenever possible. And don't give such numbers for credit card purchases; in most cases they are not needed by merchants.

Credit

• Obtain your credit report yearly from one or more of the big three credit bureaus (Equifax, Trans Union, and TRW; to contact these companies check for an office in your area), and try to correct any errors you detect.

• When rejected for credit, ask why; then verify the accuracy of the data used to reject you.

Insurance

• Obtain a free copy of your medical record from the Medical Information Bureau (617/426-3660), an agency used by more than 750 insurance companies to calculate financial risk. If (in consultation with your doctor) you detect errors, contact the bureau and demand that the record be corrected promptly.

• When rejected for insurance, ask why; then verify the accuracy of the data used to reject your policy application.

Marketing

• When offered "free" premiums, rebates, or other incentives in return for giving personal data for a marketing list, find out who will use the data and for what purpose. Ask if you can participate by giving minimal information, such as name and address.

• When you return warranty cards, provide only information essential to the warranty service. Ignore personal questions used only for marketing.

• To pare back junk mail, calls, and faxes, check the "opt-out" box many companies offer on warranty forms and subscription cards. Ask solicitors to take your name off their lists, and get the Direct Marketing Association (212/689-4977, ext. 369) to remove your name from its members' lists.

• If you participate in marketing or public opinion surveys, verify that answers will be used only in conjunction with those of other respondents, and that no personal information can be traced back to you.

Telecommunications

• Some states allow caller ID services—a way to view a caller's phone number on a monitor attached to your phone before answering. In most such states, the phone company must provide callers with an option to block viewing of their number. Ask your phone company to set up that blocking ability.

Banking

• Ask your bank to agree in writing to disclose your personal financial records only to legally authorized requesters, and to notify you when such requests are granted.



MANUELLO PAGANELLI

Charles Hamel, a critic of the Alyeska Pipeline Service Company, which operates the trans-Alaska oil pipeline, was the subject of an elaborate spying operation initiated by the company. Alyeska, through a third-party investigator, gained access to Hamel's credit and phone records, as well as personal financial data.

tronic Frontier Foundation's Berman, yet so far the government has ignored the privacy implications of the project.

With powerful industry interests arrayed against it, privacy-board legislation has gone nowhere. "American consumers have more choice than any other consumers in the world. Part of the reason is that we are an open information society," says Lorna Christi of the Direct Marketing Association, echoing the industry's general fear of government regulation."Self-regulation is working."

John Baker, senior vice president of Equifax, supports the idea of a board that conducts research and gives confidential advice to industry. But he objects to giving a privacy board the very investigative and complaint-resolution responsibilities that privacy advocates see as minimum requirements to safeguard consumer and worker rights.

For now at least, the privacy implications of new technologies are likely to be confronted by government on an ad hoc basis, and only after the public has cried out for relief.

The Role of Technology

PRIVACY ADVOCATES ARE FOND OF SAYing that the United States is "first in technology, last in privacy protection." And while technology has made our personal lives more transparent, privacy and technology are not inherently antagonistic. In the absence of a privacy board, new technologies may prove one of the most potent forces driving what *Privacy Times*'s Hendricks calls "the right to informational self-determination."

Technology has already alleviated many everyday intrusions: Airport X-ray units have made hand searches of luggage rare. With magnetic markers in books and clothing, searches of purses or briefcases in libraries and stores are quickly becoming obsolete. And encryption software makes computer files infinitely more secure than paper documents in locked cabinets.

A California company has even developed a "video game" to replace drug testing for truck drivers and other workers. Before each shift, employees go through a short hand-eye coordination exercise at a computer terminal. If they fail this simple test, they skip the shift or are moved to less demanding work that day. The technique not only screens out drug or alcohol intoxication, but also seems to identify workers who are excessively fatigued or preoccupied. One trucking company reports a dramatic decrease in accidents and worker errors after a year using the system.

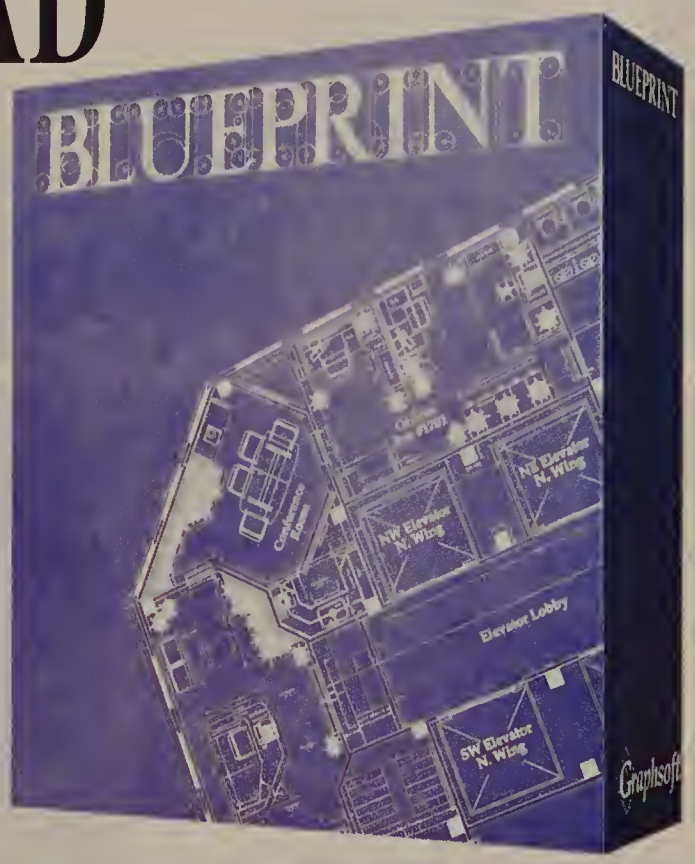
Such stories are encouraging, but so far they are rare. Industry and society face a daunting challenge: to develop technologies that protect personal privacy faster than those that threaten privacy.

The stakes are high. "Privacy allows us to move freely between the public world and private world, to form smaller communities within the larger community, to share our concerns, dreams, and beliefs with our close friends. To have secrets," Rotenberg commented in an online forum sponsored last year by the *Wall Street Journal*. "There is a close tie between privacy and pluralism. . . . This is what I suspect is at risk in the current rush to record and exchange personal data. Global Village in theory. Surveillance State in practice." m

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- ☐ fillets
- ☐ editable fills
- ☐ beziers
- ☐ wall-join
- ☐ chamfers
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3D CAD:

none

Integrated Database/Spreadsheet:

none

Programmability:

none

Blueprint 4 $ 295.00

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- ☐ Smart Cursor for locating snaps
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- ☐ polylines
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- ☐ round wall caps
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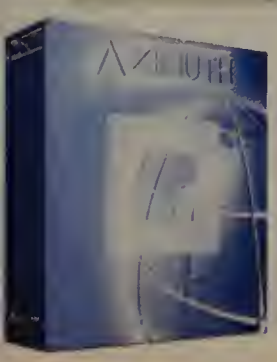
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THE BOTTOM LINE

The HP ScanJet IIc sets a new standard for affordable color scanners. Its engine is fast and well-engineered, and HP's innovative color-callibration software makes hassle-free, "true"-color scans a reality. Prices at less than $2,000, the HP ScanJet IIc is a best buy in its class.

The HP ScanJet IIc *uses a one-pass scanning method that makes it one of the fastest color scanners we've seen.* It also provides time-saving color previews that dynamically display any changes you make to the scan, such as exposure, hue, and saturation modification.

HP combines its excellent color-calibration technology with one of the best scanning engines we've seen. Our tests for resolution, consistent tracking of the scan head, and color accuracy showed **the HP ScanJet IIc to be a top performer.** In addition

TOP-NOTCH HARDWARE TEAMED WITH INNOVATIVE SOFTWARE MAKES HP'S NEW COLOR SCANNER A WINNER.

WINNER

MacWEEK 1992 DIAMOND AWARD

1992 Diamond Awards

For an all-around scanner offering high-quality color and black-and-white images, true 400-dpi resolution, and good basic scanning software, **HP's ScanJet IIc can't be beat.**

Hewlett-Packard's ScanJet IIp sets a new standard for affordable desktop gray-scale scanners. From

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WINNING COMBINATION

To test the HP ScanJet IIc, we used the same set of tests we used for our most recent color-scanner lab report. The results showed **HP's new scanner to be the best in its class in both hardware and software. The ScanJet impresses from the moment you open the box.** Other scanners use a removable screw that locks the scan head for shipping, but HP uses a locking lever that's built into the scanner itself. There's no screw to lose, and the lever is so easy to use that you'll find yourself locking the scan head more often, thereby increasing its life span.

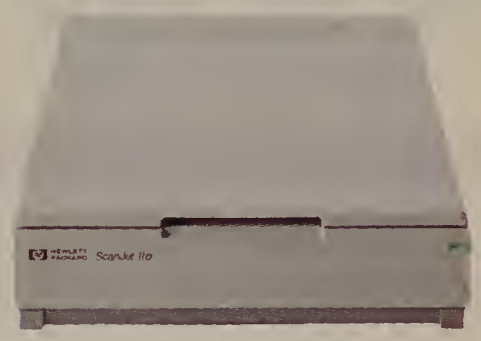
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ed..."

MACWORLD 1992 World Class Award Winner



HP ScanJet IIc



HP ScanJet IIp

We'd hate to brag. So we'll let the Mac press do it for us.

Macworld awarded both the HP ScanJet IIc and IIp their *World Class Award*, and named the HP ScanJet IIc as the *Best Color Scanner* for 1992, and the HP ScanJet IIp as the *Best Black & White/Gray-Scale Scanner*. While *MacWeek* gave their prestigious *Diamond Award* to the HP ScanJet IIc.

Speed. Simplicity. And accuracy were all applauded. It's no wonder. HP's single-pass scanning delivers both lightning-fast speed and precise color registration. TWAIN support allows scanning without having to switch between applications. And HP AccuPage technology with 400-dpi resolution can tackle the toughest OCR challenges. What's more, capabilities this advanced have never been this affordable. List price on the HP ScanJet IIc is just $1,599. The HP ScanJet IIp is just $879. And right now, the HP ScanJet IIc includes Adobe™ Photoshop LE.

Impressed? Don't just take our word for it, or even the Mac press's. Attend one of our scanning seminars that will be held April through September, 1993. To find out more about the HP ScanJet IIc and IIp or seminars in your area, call 1-800-SCANJET, Ext. 7364.*
And judge for yourself.

HEWLETT PACKARD

Reviews

IN THIS ISSUE: **Fractal Design Painter, Virtus WalkThrough, Apple Color OneScanner, Ofoto 2.0, MacWrite Pro, Apple Adjustable Keyboard, PowerBook 165c, Alias Sketch, and more**

Macintosh Computer

Macintosh LC III

PROS: Inexpensive; 25MHz 68030 processor; expandable to 36MB of RAM and 768K of video RAM; FPU socket. **CONS:** Only one SIMM slot; cannot boot with third-party disaster-recovery emergency disks. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** Base model $1349.

MW ★★★★



ROBERT PERRY

IN ITS QUEST TO GIVE US "THE POWER to be your best," Apple has once again improved both the price and performance of its successful LC line (attempting to give us the power to be our best and still have lunch money). The LC III is Apple's latest offering in the LC family.

Outside, the LC III looks like your average, mild-mannered LC-family box. But inside you'll find a machine that can outrun the likes of a IIci, sans floating-point unit (FPU). The LC III comes equipped with a 25MHz 68030 processor, 4MB of RAM soldered to the logic board, an 80MB internal hard drive, and 512K of VRAM. These features, along with the $1349 price tag, translate into brisk sales, similar to those of its older LC siblings. (Apple recently announced that the LC III would also soon be appearing in disguise as the consumerized Performa 450 at a Circuit City store near you.) And just so LC and LC II owners don't feel abandoned, Apple is offering an upgrade to the LC III for $599.

Expanding Your Horizons

THE LC III SHARES THE NOW-FAMOUS pizza-box design Apple pioneered with the original LC. As a result, the LC III, like its predecessors, has room for only one expansion slot in the form of a PDS socket, one ⅓-height hard drive, and one FDHD floppy drive. If you yearn for internal CD-ROM or SyQuest drives, yearn somewhere else. However, because of Apple's continual logic-board changes, the LC III has room on the logic board for other important expansion features.

The LC III comes with 512K of VRAM soldered to the logic board and an empty VRAM SIMM expansion slot. (The LC II's 256K VRAM SIMM had to be discarded to upgrade to 512K of VRAM.) The 512K of VRAM allows the LC III to support 8-bit video (256 colors) on 13-, 14-, and 16-inch color monitors, and 16-bit video (32,768 colors) on 12-inch color monitors. The 512K of VRAM supports 8-bit video (256 grays) on 12-inch monitors and 4-bit video (16 grays) on 15-inch portrait monitors. Adding a $99 256K VRAM SIMM yields 16-bit video on the 12-, 13-, and 14-inch color monitors and 8-bit video on 15-inch monochrome portrait monitors.

In addition to accepting the older LC-family–compatible 96-pin PDS boards, the LC III includes 18 extra pins, for using 114-pin–equipped boards. These boards run at the same 25MHz speed as the LC III's processor. The 96-pin boards run at only 16MHz, the speed of the LC and LC II's processors. The 25MHz speed comes in handy when expansion boards, such as accelerators, need to hook directly into the 68030.

The Power's in the Processor

ONE IMPORTANT PERFORMANCE FEATURE is the LC III's 32-bit bus. Coincidentally, the 68030 in the LC III is a 32-bit processor. Big deal, right? What this means is that data traveling between memory and the 68030 processor moves as fast as possible. The LC II, on the other hand, had only a 16-bit bus, yet its processor was the same 32-bit 68030. The 16-bit bus with 32-bit processor translates into data moving in two 16-bit chunks

between the CPU and memory, causing a hurry-up-and-wait effect. The LC III does away with this data logjam, and you'll notice the difference.

In Macworld Lab tests, the LC III was twice as fast as its predecessor, the LC II, and twice as fast as the Color Classic. The LC III also beat the higher-priced IIci and the IIsi. The only fly in the processing ointment was the math test. In the absence of an FPU the LC III was understandably slower than the IIci, with its built-in FPU, and the Color Classic with the optional FPU installed, but the LC III still managed a respectable third place. Unlike with previous LCs, Apple included an FPU socket on the III's logic board. Most users who need an FPU (those doing CAD tasks or rendering) should look more toward the Centris 650 than the LC III, because the Centris 650 is faster and more expandable.

Apple has finally lifted the 10MB RAM barrier that plagued the LC and LC II. The LC III can be expanded to a maximum of 36MB of RAM: 4MB on the logic board and one 72-pin SIMM slot, which can accept a 1MB, 2MB, 4MB, 8MB, 16MB, or 32MB SIMM. The new 72-pin SIMMs Apple is using are becoming popular in the PC world, as well as being used on the Centris machines and the Quadra 800. These new SIMMs don't need to be installed in sets like the older 30-pin SIMMs. But alas, you can't use older SIMMs from other aging Macs.

The LC III sports two serial (the printer port, of course, supporting LocalTalk), mono 8-bit sound-in (although Apple no longer bundles that cute little matching microphone, it is available for an additional charge) and mono sound-out, one ADB, one SCSI, and an external monitor port.

LC III Tips

The LC III is a remarkable Mac, but it has some quirks and capabilities that you should know before buying one.

Memory The LC III has only one SIMM slot. You should buy more memory now than you think you will need later, since computers always need more memory later.

That means you'll want at least another 8MB (for a total of 12MB). Avoid composite SIMMs because they run a bit slower than their rated speed and can cause system errors from data loss to lockups. If you must use composite SIMMs, get ones that are rated faster than the LC III's minimum 80ns speed—look for 70ns or 60ns SIMMs.

Getting faster-than-needed SIMMs (composite or otherwise) also has another advantage. When you buy a faster Mac later (or a logic-board upgrade), your SIMMs will likely be fast enough for that new system.

FPU The LC III has a slot for a floating-point unit (FPU), or math coprocessor, but you probably wouldn't use an LC III to do the scientific, graphics, or engineering work that uses such a coprocessor, so save yourself a hundred dollars and forgo this option.

VRAM By adding a 256K VRAM SIMM (about $100), you can get 16-bit color on a 14-inch monitor. This gives you 32,768 colors, which means your image-editing and desktop publishing programs display highly accurate versions of your color files.

The LC and LC II VRAM can be used on an LC III. This is true even though the LC III uses 256K SIMMs, not 512K SIMMs. Using a higher-capacity VRAM SIMM on an LC III won't give you more colors, but you will save money if you salvage the SIMM from an older LC or if you buy the LC III upgrade board.

Restart button Like previous LC models (and the Centris 610), the keyboard's restart button doesn't work. Instead, you must use the LC III's power-on button. This is a silly, nonstandard design. You can get around it by using the PowerKey from Sophisticated Circuits ($119, 206/485-7979; see *Reviews, Macworld,* December 1992).—GALEN GRUMAN

Enabler Blues

MY ONLY REAL COMPLAINT WITH THE LC III is the inability to boot from various third-party disaster-recovery emergency disks, such as Norton Utilities. Unfortunately, the LC III cannot boot with anything older than System 7.1, and in conjunction with the 7.1 release, Apple is now using System Enablers that are model-specific extensions. You can boot from the original LC III disks in an emergency, but there are no recovery programs on those disks, other than Apple's Disk First Aid. Hardly what you need in the event of a real disaster. You can make your own boot disk using Apple's Installer, but even a minimal system leaves only 270K for your own use—not nearly enough for most high-powered commercial recovery programs. (Registered owners of Norton Utilities can call technical support for instructions on how to make an emergency boot disk that leaves room for Norton.)

So Who Needs It?

THE LC III FITS THE BILL AND THE POCKETbook for Most home and small-business users. At $1349, plus the price of a color monitor, the LC III is sure to be a hit. (I found that the average street price for the base model was around $1275.) If modeling, rendering, and Ethernet are your hot buttons, the LC III is probably not the machine for you. But for day-to-day business uses, such as word processing and spreadsheet and accounting tasks, run, do not walk, to your local dealer and pick up an LC III before Apple changes its mind.—GARY T. KRATZER

MW LAB How Fast Is the LC III?

SYSTEM PERFORMANCE (times as fast as a Classic)

PEFORMANCE COMPARISONS (in seconds)

= Fastest result in class for each test.

Common — We timed typical business tasks in Microsoft Excel and Word that use the processor, drives, and video display. Longer bars are better.

Scientific — We added to our common tasks several scientific calculations that use floating-point math. Longer bars are better.

Processor — We timed several tasks in Claris FileMaker, ClarisWorks, Deneba UltraPaint, Microsoft Excel, and Microsoft Word. Shorter bars are better.

Drive-Access — We timed file opens in Microsoft Excel and Microsoft Word, and a disk-based sort in Claris FileMaker. Shorter bars are better.

Video-Display — We timed vertical scrolling in ClarisWorks, Microsoft Excel, and Microsoft Word. Shorter bars are better.

Floating-Point — We timed scientific recalculations (which use floating-point math) in Microsoft Excel and ClarisWorks. Shorter bars are better.



Color Paint Software

Fractal Design Painter 2.0

PROS: Previews custom brush settings; lets you create custom paper textures; new frisket functions include text tool; superb magic-wand tool; realistic lighting functions; textured glass effect; customizable interface. **CONS:** Can't read fonts from System file; slightly buggy; slow; superficial manual. **COMPANY:** Fractal Design Corporation (408/688-8800). **REQUIRES:** Mac II; 2.5MB of RAM; hard drive; color or gray-scale monitor; System 6.0.5; 32-bit QuickDraw. Recommended: 4MB of RAM; 24-bit video board; pressure-sensitive tablet. **LIST PRICE:** $399.

MW ★★★★

PAINTER 2.0 IS THE MOST AMBITIOUS graphics software update since Deneba's Canvas 3.0. Not satisfied to be the foremost image-creation program on the Mac, Painter 2.0 sets out to tackle the world of image editing, currently the domain of Adobe Photoshop. Like Canvas, Painter throws in every feature you could possibly want plus a dozen or so you never knew you needed. But unfortunately, Painter's everything-but-the-kitchen-sink philosophy leads to an astoundingly complex interface that sometimes gets in the way of using the software, again reminiscent of Canvas.

Getting More Real Every Day

VERSION 2.0 SUPPLIES THE USUAL HOST of preset brushes plus a few changes. Many of the pen tools are now antialiased, eliminating their previously jagged edges. There's also a handful of single-pixel brushes among the pencil, water, and felt-pen tools, ideal for sketching and correcting pixel-by-pixel details. But the most distinct of the new tools are the liquid brushes, which smear on-screen paint in a variety of ways. You can create coarse smears, oily smudges, and fantastic continuous-color swirls. You haven't seen stuff like this since you knocked over your oil painting in art school.

If you want to create some custom brushes, Painter adds a new Brush Stroke Designer function. Rather than memorizing the meaning of such wholly incomprehensible options as Resaturation and Contact Angle, you can view the results of your settings in a preview window. Then, when you get the exact look you want, you can save the custom brush for use in future images. Unlike standard brushes, these custom brushes—Painter calls them *looks*—incorporate the paper-texture setting and can even automatically load textures from disk.

Painter 2.0 ships with more than 50 new paper textures, including a hefty supply of halftone patterns and a small sampling of wilder surfaces from Fractal's independent Really Cool Textures collection. As if the new textures weren't enough, Painter now lets you design your own surfaces by selecting a portion of an image and saving it to the texture palette. Rather than leaving you to your own devices to create a pattern that repeats seamlessly, the program can automatically fade one tile in a pattern into its neighbor. According to your specifications, the right edge of one tile blends with the left edge of the next; the bottom edge of a tile blends with the top edge of the one below it. Painter is the only program that helps you avoid those unrealistic checkerboard effects that plague most user-defined textures.



DIANE FENSTER

The Four Seasons Diane Fenster created this image starting with a stock photo. Using many of the new features including the Magic Wand tool, the High Pass effect, Lightning effect, and the text tool, she transformed a plain image into a work of art.

New Directions in Selections

VERSION 2.0 INTRODUCES FOUR NEW frisket tools. The line tool lets you create friskets with straight edges and even constrain the angles to multiples of 45 degrees, giving you a degree of control missing from earlier Painter frisket tools. The text tool introduces type as frisket outlines. After you enter text, you can paint inside the outlines or apply filters to create unparalleled text effects. The only problem with this tool is that it requires that you load PostScript or TrueType font files from disk rather than simply referencing the fonts loaded into your system, the method accepted by just about every other Macintosh program.

The third frisket tool, the pointer, lets you move and resize a frisket as though it were a shape in a draw program. You can now create and combine multiple friskets within a single image, and even edit individual frisket outlines by shift-dragging with the standard knife tool. The new frisket metaphor is more flexible than its predecessor—roughly akin to paths in Photoshop—but its implementation takes some getting used to. It can be a shock to switch to the pointer tool and see every selection outline you ever created waiting for you just in case you decide to use them again.

Fractal Design touts Painter's fourth tool as "the most magical magic wand ever," and I'm inclined to agree. Like the magic wands found in most color paint programs, Painter's magic wand allows you to select a region of similarly colored pixels. But Painter's magic wand goes further by enabling you to isolate a selection by hue, saturation, or brightness. After you click or drag with the wand, Painter displays a slider bar for each of the color characteristics to show the range of colors selected. You can then manipulate the sliders after the fact to increase or decrease the size of the selection.

Taking On the Photo King

PAINTER 2.0'S BRUSH AND FRISKET enhancements will help you create serious art, but its rollout of state-of-the-art special effects will make your jaw drop. First, you can shine lights onto a painting as if it were mounted in an art gallery. Painter's lighting effects are unlike anything I've seen in competing two-dimensional graphics programs. As with 3-D renderers, in Painter you can specify the

continues



DEKE MCCLELLAND, ORIGINAL IMAGES COURTESY 21ST CENTURY MEDIA

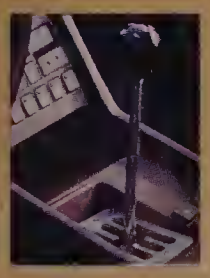
Never a Cold Day Starting with a Mayan statuette from the PhotoDisc library (left), I lit the image in two passes with blue and green lights, refracted the background through contoured glass, and inverted the background to achieve the icy blue texture on right. I painted inside the type friskets using a pressure-sensitive tablet (right side). Finally, I added the Teotihuacan head erupting from the statuette's chest (left)—repeated above and below the image through another glass pattern—and colorized it to match the statuette.

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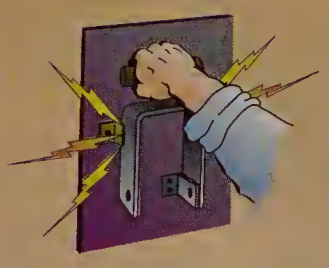
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**Mac IIsi and IIci are now available. Mac SE/30, II, IIx and IIcx have limited availability thru June, 1993. Mac IIvi, IIvx and Performa 600 have limited availability thru July, 1993.*

color, distance, and elevation of the light source, change the way it focuses on an image, and even introduce a modicum of ambient light. While it falls short of true 3-D lighting—you can't cast shadows or create reflections—it's a great way to add drama to an image.

Other new eye-catching effects enable you to refract an image through textured glass, transform it into a marbleized pattern, or overlay a random collection of transparent spheres. Regardless of the effect you choose, Painter 2.0 lets you try it before you commit to it by previewing a detail of your image at actual size. You can drag inside the preview window to scroll to a different part of the image. Painter's previews are implemented as well as any I've seen, which is a good thing because once you accept your settings, you can't cancel the effect until it's run its full course.

To reduce the amount of screen clutter caused by all the floating palettes, version 2.0 lets you tear off individual brushes, looks, and paper textures. This allows you to open only the items that you use most frequently and free up more room for your image. Even so, the program is enormously complicated and sometimes creaks under the burden of its own weight. I ran into a number of bugs, especially in the course of editing very large images. In one case, Painter created a 30MB virtual memory file on disk to accommodate an 8MB JPEG image and then refused to release the virtual file—even after I closed the image—until I quit the application. Other times the program was just plain slow. The Brush Stroke Designer window can take several minutes to display the effects of a single brush. Finally, the documentation breezes through the information much too quickly to provide any real insight into the program. Fractal Design claims that an additional tutorial manual and bug-fix version of the software will be available to registered users by the time you read this.

In the meantime, if you can put up with a few inconveniences and surprises, Painter will earn your admiration. It's a gas, easily racking up a 9.8 on the muck-around-and-forget-you-have-a-deadline scale. It provides the real meat-and-potatoes tools required by professional artists. Many of its functions—natural-media brush tools, the color-sensitive magic wand, 2-D lighting effects—are entirely without peer. This is undoubtedly one of the finest and most ambitious programs available for the Mac. If it keeps sailing along at this pace, Painter may overtake Photoshop as the best bitmapped graphics program running on a personal computer.—DEKE McCLELLAND

Multiplatform Printer

PrintPartner 10W

PROS: Crisp 300-dpi resolution; relatively fast; automatic emulation switching. **CONS:** Won't print TrueType fonts other than the 35 that come with printer. **COMPANY:** Fujitsu Computer Products (408/432-6333). **LIST PRICE:** $2450.

MW ★★

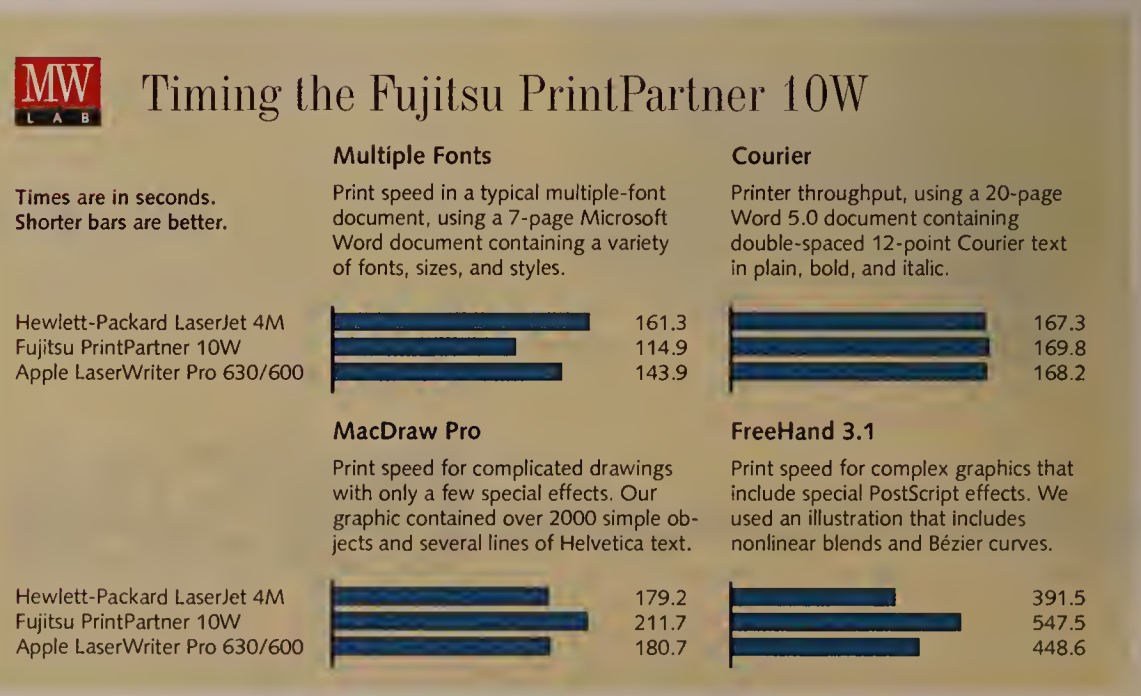
YOU JUST KNOW THAT SOME HARDware was designed with a certain environment in mind. The Fujitsu PrintPartner 10W printer is such an animal. Complete with emulators for four printer technologies—Hewlett-Packard LaserJet III, IBM ProPrinter XL-24e, Epson FX-850, and Microsoft's TrueImage—the printer is clearly designed to fit into a multiplatform environment that includes DOS, Windows, and Macintosh systems.

On the plus side, The PrintPartner employs a proprietary Fine ART (Advanced Resolution Technology) function that refines its 300-dpi output by smoothing fuzzy character edges. With an output capacity of 10 pages per minute, the printer isn't a speed demon, but it's still faster than the average office printer. In Macworld Lab tests, it performed well, particularly in multiple-font and PageMaker 4.2 tests. In addition, the printer supports automatic emulation switching, which means that in a multiplatform environment with various types of computers connected to its serial, parallel, and AppleTalk ports, the PrintPartner can automatically switch to the proper emulation mode for the computer currently attempting to print.

The main drawback for Macintosh users, however, is the way the PrintPartner 10W handles TrueType fonts. Each of the four emulation schemes included with the PrintPartner employs unique rasterizers and scalers to create type. Macintosh users rely on TrueImage 1.11, a PostScript Level 2 emulator built around a TrueType rasterizer that converts Type 1 fonts into TrueType format. Consequently, Type 1 fonts and graphics files print quite nicely. Unfortunately, however, the 35 TrueType fonts that are resident in the printer are the only TrueType fonts that the PrintPartner recognizes. You cannot download more from your Mac. (Windows users, on the other hand, have no problem printing TrueType fonts that are not resident in the printer.) The upshot is that Macintosh users who have installed System 7 have access to a variety of TrueType fonts that simply will not print on the PrintPartner. A software driver could solve this problem, but Fujitsu currently relies on Apple's LaserWriter drivers and has no plans to include one of its own.

The PrintPartner comes with a main paper tray that holds up to 250 pages of 16- to 24-pound paper. The universal tray for manual printing accepts legal-size and heavier 24- to 41-pound paper, as well as 5 envelopes at a time. Optional niceties include a second paper cassette ($299) that also holds up to 250 sheets. An optional face-up tray ($20) accepts output at the rear of the printer.

If this were a Windows magazine, I would give the PrintPartner 10W four stars. It is fast and relatively inexpensive, and the print quality is quite nice. But the fact that the printer cannot print some of the fonts that are shipped as part of the Macintosh Operating System can only mean frustration for its users. Until Fujitsu decides to begin shipping a printer-specific driver with the PrintPartner 10W, two stars will have to do.
—SUZANNE STEFANAC



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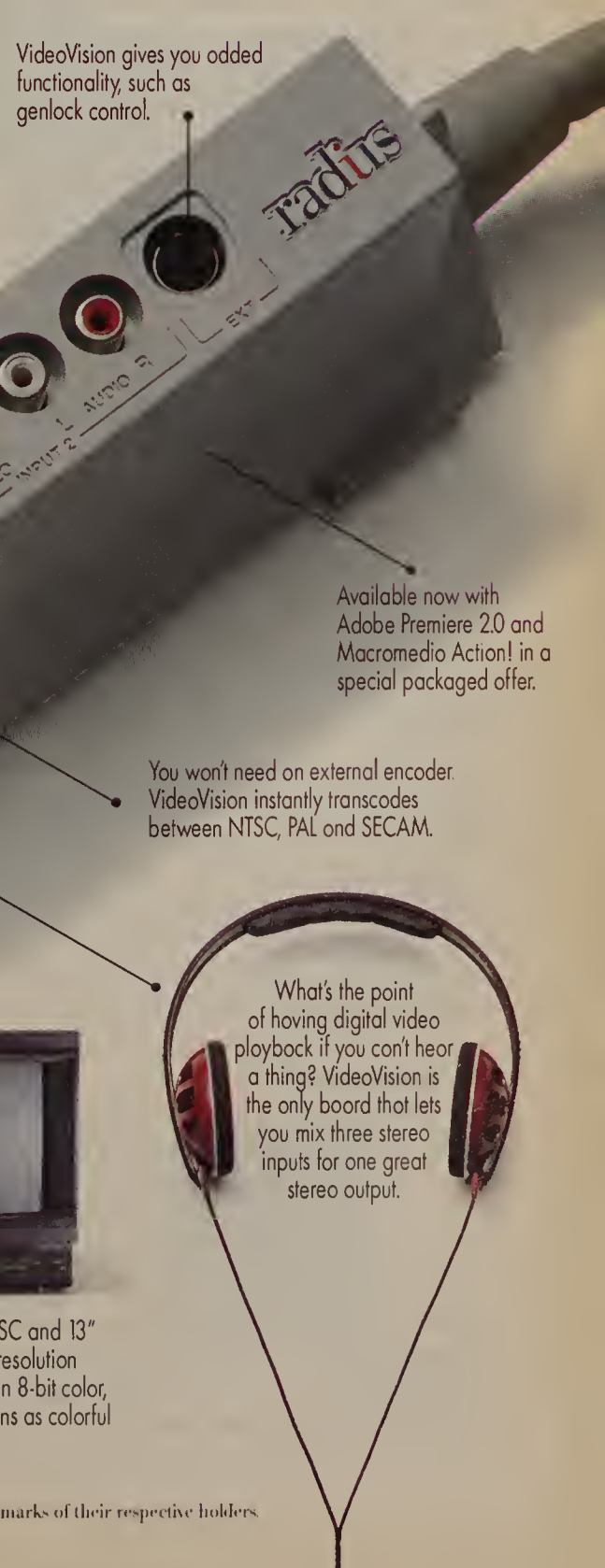
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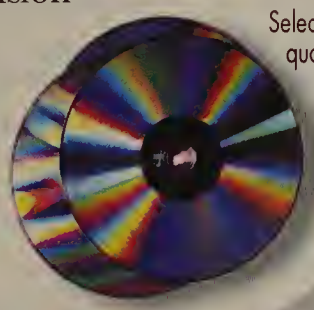


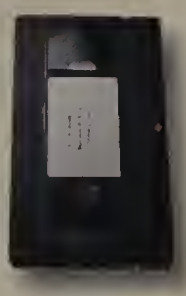
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Flatbed Scanner and Scanning Software

Apple Color OneScanner

PROS: Includes Ofoto 2.0 and HyperScan; good differentiation of subtle density differences; re-creates sharp details and unpolluted colors. **CONS:** Slow; no Twain support. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $1349.

MW ★★★★

Ofoto 2.0

PROS: Closed-loop calibration and ColorSync support provide fidelity between original and printed result; excellent line-art output; advanced halftoning for laser output; automatic pattern removal for previously halftoned originals; competent controls for tone correction; acceptable sharpening; good correction for out-of-focus originals; support for Apple Color OneScanner's adaptive A/D converter. **CONS:** Poor feedback for manual tone corrections; little control over sharpening; slow as molasses. **COMPANY:** Light Source Computer Images (415/461-8000). **REQUIRES:** Mac LC; 2MB of RAM; hard drive; System 6.0.7. **LIST PRICE:** $395.

MW ★★★

WATCHING THE CLOCK

	Prescan 8.5 by 14 inches, 24-bit color	Scan 4 by 5 inches, 150 dpi, 24-bit color
Apple Color OneScanner with Ofoto 2.0	1 minute 14 seconds	2 minutes 16 seconds
HP ScanJet IIc with Ofoto 2.0	1 minute 2 seconds	4 minutes 33 seconds
HP ScanJet IIc with DeskScan II 1.0	32 seconds	31 seconds*

*Times are on a Macintosh IIcx running System 7.1. * Includes saving to disk as a TIFF file, which requires an additional (lengthy) step in Ofoto.*

APPLE PROMOTED THE ORIGINAL Apple OneScanner using Light Source's Ofoto software as the first scanner to provide one-button, automatic scanning of line-art and gray-scale images. The company has taken the next step, with the release of the Apple Color OneScanner, using Ofoto version 2.0. The scanner is also bundled with the latest version of HyperScan, which is handy for capturing images for use in HyperCard stacks. There is currently no Twain driver for the scanner, however (Twain is a standard interface language for scanners developed and promoted by Aldus).

The new version of Ofoto is also available from Light Source for use with a variety of other scanners, offering almost all the features that it provides in combination with the OneScanner.

The Hardware

THE APPLE COLOR ONESCANNER IS AN impressive unit. The results of my benchmarking demonstrate unpolluted colors and sharp image details, perhaps due to color filters and lenses that Apple claims were specially designed and tuned for the scanner. The unit also boasts an adaptive analog-to-digital (A/D) converter, which works with Ofoto to improve the quality of images that have limited tonal range.

With images that don't span the whole gamut of grays or colors from dark to light, Ofoto uses the full sensitivity range of the OneScanner hardware to measure that limited tonal range. This method allows greater differentiation between subtle density differences within the image's tonal range, resulting in a more detailed image.

The Software

THE SCANNER IS A GOOD PIECE OF HARDware, but Ofoto 2.0 is much more significant. It adds many new features—notably color support—to the already impressive toolbox of its gray-scale counterpart.

The heart of Ofoto's approach is its adaptive (or *closed-loop*) calibration. You print a calibration chart on your final output device, scan that chart, and Ofoto builds a calibration table for that device. When you create your next scan, you apply that calibration, and Ofoto ensures that the output matches the original (as far as possible, at least).

In one test of Ofoto's calibration, I printed a calibration chart on a Canon CLC500 color laser copier with EFI Fiery RIP, built a calibration based on that chart, then scanned the chart itself, using that calibration. The CLC output from that scan was almost indistinguishable from the original chart, signaling excellent calibration. Ofoto will even write ColorSync profiles so you can extend the calibration process to include applications that support ColorSync.

Closed-loop calibration has one potential flaw—what if you don't want the final image to look like the original? In most cases a scan requires some tweaking to get it looking good in print. If you plan to do that tweaking in another application, such as Adobe Photoshop, then calibration to the original at scan time is premature—you throw away some information during calibration, so it's not available during the editing and correction process.

If, on the other hand, Ofoto gives you all the tools you need to produce scans that are ready for the printed page, calibrating to the original is a good approach. But does Ofoto give you those tools?

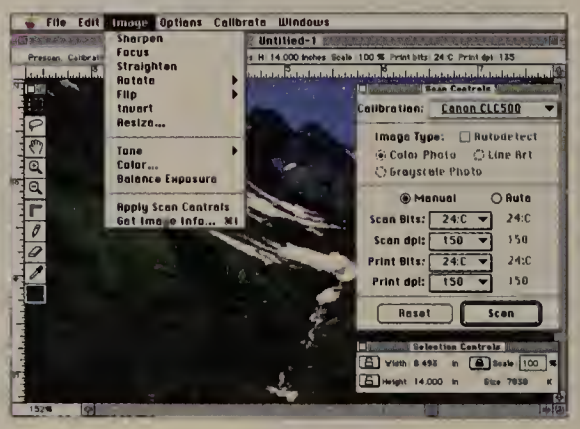
The answer is mixed. Ofoto's Balance Exposure command sometimes improves an image quickly and automatically. That's the exception, however. There's an easy method for matching colors between originals (so skin tones match between several photos taken under different lighting conditions, for instance), but it doesn't provide much control—you pick up two colors with an eyedropper tool, and Ofoto adjusts the image to match the colors. The results are often excellent, but sometimes not.

By combining three Ofoto tools—Highlight/Shadow, Brighten (Midtones), and Calibration Range—you have essentially the same controls as in Photoshop's Levels dialog box, the primary tool used to correct color and gray-scale scans. You don't receive the excellent feedback (histograms and tone-clipping representations) that you do in Photoshop, however. You can achieve the same results in Ofoto, but your only feedback is what the image looks like on screen.

The other important tool for producing publication-ready scans is sharpening. While Ofoto provides unsharp masking—the industry standard—and it optimizes the sharpening settings for the resolution of your scan, it doesn't provide the explicit controls over unsharp masking that Photoshop does, and in my tests the results from Ofoto aren't quite as good as Photoshop's. Ofoto's command for correcting out-of-focus originals does a better job than Photoshop.

Ofoto's method for producing high-quality line art from imagesetters is inge-

continues



Oh! Photo Light Source's Ofoto software is the brains behind the Apple Color OneScanner. This combination provides most of the tools you need to produce good-quality scans with a minimum of muss and fuss.

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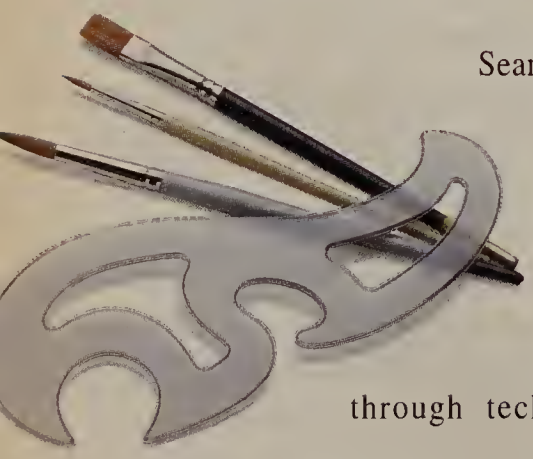
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Common tool bar with module-specific tools	YES	NO	NO	NO
Log-in scripts/phone book	YES	NO	NO	YES
Multiple columns can be turned on/off anywhere on the page	YES	NO	NO	NO
Auto Sum Tool	YES	NO	NO	NO

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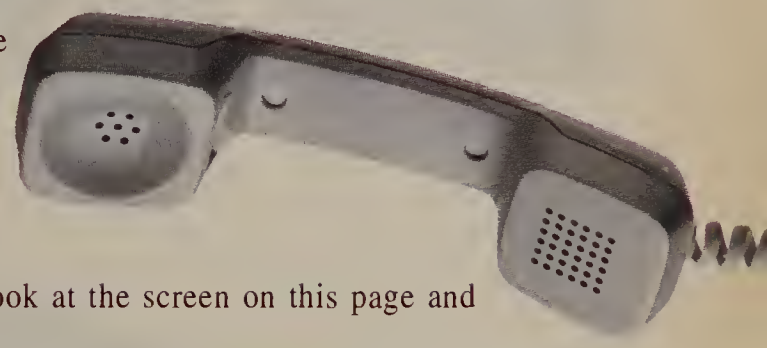
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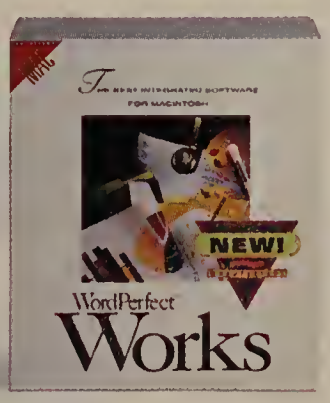


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nious. By scanning at 300 dpi in gray-scale mode, increasing the resolution to 635 dpi by interpolating dots, sharpening (using a sharpening routine optimized for line art), then resolving the information down into a 635-dpi line-art image, Ofoto provides line-art output far surpassing what could normally be achieved with a 300-dpi scanner. You could imitate this method using any gray-scale scanner and Photoshop (and patience), but Ofoto does it for you automatically.

Ofoto also has an ingenious method for producing halftones on laser printers (too complex to explain here), providing a 53-lines-per-inch (lpi) screen frequency and 256 gray levels where you would normally expect only 33 gray levels.

Other features of Ofoto include the ability to remove patterns from previously halftoned printed images (unavailable in other software, and it works surprisingly well, except for images with screens between about 55 and 90 lpi, where it's less than adequate); support for image compression using QuickTime; automatic straightening and explicit rotation with almost no image degradation; a virtual-memory system for scanning images larger than memory; simple monitor calibration for a more faithful on-screen representation; and color separation into CMYK TIFF, EPS, or DCS files.

Speed's the Issue

THE ONE AREA WHERE OFOTO REALLY falls down is speed—especially scanning speed—as you can see in "Watching the Clock." The speed problem is obviated to some extent by Ofoto's limited multitasking (you can queue up a series of scanning and correction tasks, and go about your work in another application without too much intrusion by Ofoto), but it's still painfully slow.

Ofoto 2.0 often produces good results without requiring much knowledge of the scanning, halftoning, or printing processes. It rarely produces the best scan possible, however, for a given image and output method (the exception is with line art destined for imagesetter output, where Ofoto produces the best results I've seen). If you really don't want to learn how to produce good-quality scans, you don't produce many scans, and you don't care about producing the best quality possible, the Apple Color OneScanner is a good choice.

If you do a lot of scanning, however, and if you want to massage scans manually in Photoshop or the like for top-quality results, you're better off with a faster scanner-software combination like the Hewlett-Packard ScanJet IIc using DeskScan.—STEVE ROTH

System 7 Utilities

7th Heaven 2.5

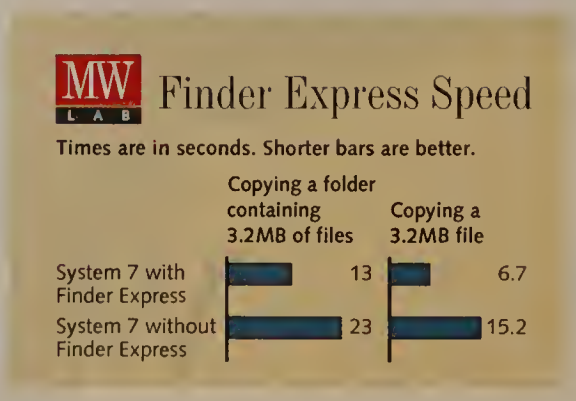
PROS: Nice set of tools with some useful goodies; some utilities are integrated into system software and are not control panels or extensions. **CONS:** Some utilities are more fluffy than useful. **COMPANY:** Logical Solutions (612/659-2495). **REQUIRES:** Mac Plus; System 7. Recommended: 4MB of RAM. **LIST PRICE:** $99.95.

MW ★★★

IT SEEMS LATELY THAT EVERYONE and their dog is coming up with enhancements to System 7. I have to admit, I'm happy with System 7 just the way it is. I have no use for tear-off menus, enhanced printer selection, or new typefaces for my menu bar. Real wireheads know that the benefit these doodads provide is far outweighed by the prospect of conflict with system software and applications. Now, along comes 7th Heaven, a set of seven enhancements to System 7. The best part about these utilities is that they don't use gummy extensions or control panels to clog up the operating system; they actually replace part of the System file by writing new code and removing existing Apple code. Some of these utilities are powerful productivity-enhancing tools; some are just for fun. Whether they're tailored for your work environment or not, only you can determine. Read on.

Five of the seven utilities might be helpful in your day-to-day work routine; they include a file-copying accelerator, a file-mapping utility, a system-information collector, a screen saver, and a simple desktop calendar. Rounding out the collection are a fantastic desktop-pattern editor and a system-alert-icon changer.

FinderExpress is the most useful tool of the set. It speeds file transfers by copying data into RAM and then copying the data to the target medium in one continuous stream. Apple's way is to copy a tiny piece into memory, write it, then copy another tiny piece and write it, until the whole thing is copied. FinderExpress cuts the transfer time almost in half. If you regularly transfer large amounts of data, this tool is a godsend.



FileMapper connects orphaned data files with an appropriate new mommy or daddy application. For example, if you have MacWrite II files but don't have MacWrite II, FileMapper can create a map that lets you just double-click on a MacWrite II document to open it; the map tells your Mac to launch MS Word to open MacWrite II files. The only catch is that you must have an application that's able to read the orphaned file format, since FileMapper has no translation capabilities. You must also have the orphaned data file before you can configure a map for it. This is annoying because it disallows preconfiguring an application to read certain file types, although several sample formats are included.

Informant is an application that probes your Macintosh for hardware and system software information. It lists your extensions and control panels, CPU configuration, and installed NuBus boards. This tool is invaluable for those times when you or a company technician needs to troubleshoot your system.

The screen saver (Vector Plasma) is extremely simple and takes up only 256K of RAM. Unfortunately, you must launch it; you cannot set it to go on after a certain period of inactivity. Logical recommends Vector Plasma for server or mail-center CPUs whose screens get little use.

The 7th Heaven calendar excels in its minimalist approach to daily organization. It's basically a desktop monthly desk calendar with a notepad for jotting down reminders. It may in fact be too simple—you can just as easily look at your wall or desk calendar and make notes on paper as launch the application.

My favorite part of 7th Heaven is the desktop-pattern editor, Chameleon (available alone for $59.95). Some sample files are included, and you can copy any PICT file directly to the pattern editor. After selecting or creating a pattern, you can easily install it in your system.

In the frivolous category is Red Alert. This little gem changes the look of your system-alert icons—the talking blockhead, the triangle with the exclamation mark, and the stop sign. You have several choices, such as plastic, Voltaire, Agent Orange, and Medieval.

I was impressed with the way these utilities slid quietly into my System File and caused no system conflicts or crashes. This is really 7th Heaven's strong point. But when I whittle the utilities down to the ones I use, it's a short list, including only FinderExpress, Chameleon, and Informant.—MATTHEW CLARK

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Word Processor

MacWrite Pro

PROS: Text-wrap around graphics and text boxes; easy-to-use table function; paragraph and character style sheets; sticky notes; multiple columns of variable widths; text divisible into separately formatted sections; supports most major text and graphics formats. **CONS:** Lacks graphics tools; style sheet design has a few rough edges; restricted table size; uneven column widths not mirrored in facing pages; minor display problems. **COMPANY:** Claris Corporation (408/987-7000). **REQUIRES:** Mac LC; hard drive; System 6.0.5. **LIST PRICE:** $249.

MW ★★★★

TO THOSE OF US FAMILIAR WITH MacWrite II, MacWrite Pro looks—at least superficially—a lot like its predecessor. The uncluttered ruler appears to be almost identical, menus are still relatively spare, and the only window view is of the fully formatted page, margins and all. But the resemblance between parent and offspring is, in fact, little more than skin deep. The old Spelling menu, for example, has been replaced with one called Frame. However, the frame concept encompasses four important functions, all of them new to MacWrite Pro: picture frames, text frames, tables, and sticky notes.

MacWrite Pro places all graphics, in MacPaint, PICT, color PICT2, TIFF, or EPS format, in a graphics frame. Graphics can be scaled, cropped, or moved within the frame. The frame itself can sit in a line of text, have a fixed position on the page, or be linked to text (and thus move vertically—unfortunately, sometimes right into the page margin—as the text is edited). By dragging the frame or by means of dialog box settings, in-line graphics can be shifted up or down relative to the text baseline, and text-linked and fixed-position graphics can be repositioned anywhere on the page. Text automatically wraps around fixed-position frames (or, if you elect, around the image inside the frame). Disappointingly for those who would like to create no-fuss drop caps, you cannot wrap text around text-linked or in-line graphics frames.

In terms of positioning and text-wrap, text frames behave like picture frames. They can expand automatically to fit the text contents, or you can specify fixed dimensions. As is true of graphics frames as well, you can apply simple borders and fill the text frame with a color or shade of gray. Text frames are thus an excellent way to generate sidebars, call-outs, and titles that span multiple columns.

A MacWrite Pro table is a special kind of frame that cannot be larger than one page or 100 cells. You can easily create tables either directly on the page, through a dialog box, or by converting tabbed text. A special Table menu makes it easy to add or delete rows or columns, merge cells, specify the row height and column width, and add borders to individual cells or groups of cells. You can fill each cell in a table with a different color, and rows can be sorted by the contents of any column. (Standard paragraphs can also be sorted, but only by the initial characters.) By dragging the column divider, you can set cell widths on a column-by-column basis.

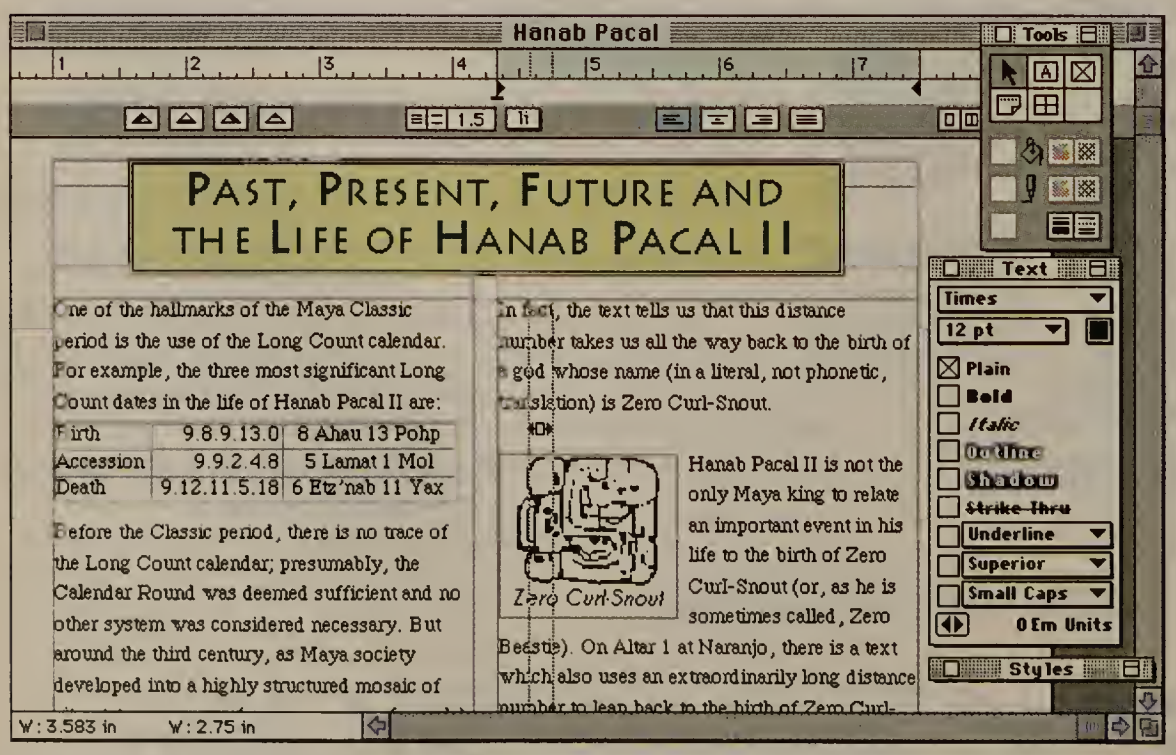
As with other kinds of frames, you can place the MacWrite Pro equivalent of Post-it notes anywhere on the page and make them any size. Besides entering text in a note, you can attach a voice recording to these sticky notes, which are always affixed to a specific location. Text runs underneath, but you can easily hide (and display) all notes or shrink one or all notes to little yellow squares (and restore one or all notes to full size).

Sections are another new concept for MacWrite Pro. The number of columns, the right and left headers and footers, and the page numbering must all be uniform within one section. But by dividing a document into sections (each of which can start on either a new line or a new page), you can change the pagination from one part of the document to the next, vary the number of columns on a page, or create a new header or footer for any page.

Most of MacWrite Pro's new character and paragraph style sheet capabilities are easy to use and obvious. Styles can be defined by example or in a dialog box; a number of built-in (and easily editable) styles are automatically assigned to footnotes, headers, footers, and so on. Confusingly, while paragraph styles can be removed with the No Style style, character styles cannot (you have to use the Plain Text command instead). And when you're editing styles in the Define Styles dialog box, you have to be careful to use the Cancel button when you finish editing because, counterintuitively, the OK button actually applies the style to the current paragraph. As for formatting options, you can now adjust character spacing in increments as small as 1/100 of an em space. New paragraph attributes can keep single paragraphs from splitting and can keep separate paragraphs from splitting apart across two pages. Line spacing is now specified as either automatic (by lines) or fixed (by points, inches, or millimeters).

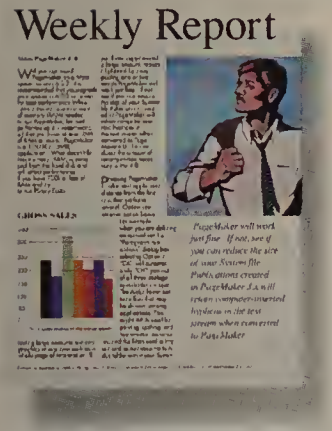
Two other noteworthy enhancements are column widths and palettes. Column widths can now vary from column to column. Although a Left/Right Pages option creates left and right headers and footers and (if the margins are uneven) mirrored margins for left and right pages, it does not create mirror images of uneven column widths. Floating palettes provide quick access to table tools and text, style, and mail merge commands. Conveniently, palettes can be easily moved, opened, closed, or shrunk to nothing more than

continues



Easy Columns Uneven column widths are easily specified in MacWrite Pro by dragging the column divider. As you drag the divider (or any boundary or frame anywhere in the program), the resulting dimension appears in the lower-left corner of the window. Also visible are three palettes (one collapsed), a small table, a filled text frame with a double-line border, and a graphics frame within a text frame.

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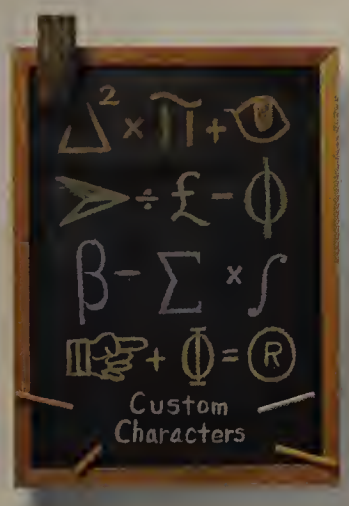
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a tiny title bar (to clear your view), either individually or collectively.

Other MacWrite Pro enhancements include up to 81 different colors for text, frame borders, and fills; zoom controls that display a document at anywhere from 25 percent to 400 percent of original size; simple, on-screen repositioning of document margins and header and footer areas; the ability to both read and write documents in a wide variety of common formats; optional automatic document save and backup; a command for counting the number of characters, words, lines, and paragraphs; support for System 7's publish and subscribe; a fully integrated thesaurus; and if you purchase a foreign-language dictionary, the ability to mark off foreign-language text and check spelling for both English and the foreign language at the same time.

Although Claris has had plenty of time to work the bugs out, MacWrite Pro still could use some polish. In addition to issues already mentioned, MacWrite Pro has minor display glitches (which appear to have no effect on data integrity). The program refuses to open a document with the margins centered in the window. Some essential information (such as the list of normally invisible characters and what they mean) is nearly impossible to find. There are times when the thumb tab on the scroll bar bears little relation to one's position in the text. I've also gotten so badly tied up in conflicts between tables and neighboring text that I had to trash the entire thing, and I once lost an entire page of text while experimenting with a graphics frame (although I have since been unable to reproduce the problem).

On the other hand, MacWrite Pro is a considerable improvement over its predecessor, and as I've already noted, many of its new features are very well executed. The table function is a lot easier to use (though less powerful) than the one in Microsoft Word, the spelling checker is fast and efficient, there are lots of handy mouse shortcuts, the mail merge facility is still probably the least painful one around, the notes function is the best one I've seen, and the palettes are simple but elegant. Yes, it's true, it's been over two years since MacWrite Pro was supposed to hit the shelves. But if you own MacWrite II and have been patiently cooling your heels all this time, wait no longer and upgrade to MacWrite Pro. If you've been really patient and put off choosing a basic word processor until Claris came through, put those pens and pencils away: MacWrite Pro is here and it's definitely worth serious consideration.
—ROBERT C. ECKHARDT

Keyboard

Apple Adjustable Keyboard

PROS: Adjustability. **CONS:** Very limited adjustability; hands must still be held parallel to the ground. **COMPANY:** Apple Computer (408/996-1010). **REQUIRES:** Any Mac with ADB port; System 6.0.7. **LIST PRICE:** $219.

MW ★★

IN *MAO II*, DON DELILLO REFERS TO "the deep spasm near the shoulder blade that's charged with mortal reckoning," an image I suspect he developed while writing ten novels on the standard flat-slab keyboard. Legions of computer users suffer chronic pain caused by frequent work on the flat slab, some with the deep spasm near the shoulder blade that DeLillo and I have, but even more with tendinitis of the wrists and hands, or with carpal tunnel syndrome. Apple has finally made an effort to improve on the flat slab, but I hope it won't be its last, because the Apple Adjustable Keyboard doesn't help me in the least.

The keyboard offers users only a slight adjustment in the typing position of the wrist and hand. It's split into two halves that can be angled from 0 to 30 degrees. Theoretically, this angle corrects a crook in the wrist known as ulnar deviation. That's fine for anyone in pain for that one reason, but what about the rest of us?

Dr. Robert Markison, a hand surgeon and authority on repetitive strain injury (RSI), says the Apple Adjustable Keyboard does nothing to eliminate the far more serious problem of pronation—working with the palms parallel to the ground—which stretches all the muscles and connective tissue from elbow to hand. Dr. David Rempel, a physician and research scientist studying RSI, counters that there is far more evidence of injury caused by ulnar deviation than by pronation. In my own case, it's pronation that causes painful shoulder and neck strain.

To see what's at stake, put your hands on a standard keyboard. Your arms hug your sides and your shoulders scrunch inward because your hands are held parallel to the ground. Your forearms' muscles and tendons are tight, and unless you have a good wrist rest, your wrists may be cranked upward at an injurious angle.

Now keep your elbows bent, but lift your hands from the keyboard and turn them perpendicular to the floor, thumbs toward the ceiling. The muscles and connective tissue involved in sustaining the flat-slab position should now be much more relaxed. To achieve a position closer to this, a keyboard must adjust not only on the horizontal plane, like the Apple Adjustable Keyboard, but also vertically.

Other sufferers of keyboard-related injuries, including members of the RSI Network (an interest group)—some with tendinitis, some with carpal tunnel syndrome, and some with both—confirm my experience that the Apple Adjustable Keyboard addresses only part of the ergonomics problem. We still await a keyboard that adjusts on a vertical plane and, since holding any position for too long causes pain, one that comes in two separable pieces, so that we can vary the distance between our hands, opening our shoulders to a comfortable position.

In the meantime, I'll stick with the Apple Extended Keyboard. Its numeric and function keys are easier to use than those on the new keyboard. In addition to being located on a separate keypad, the numeric and function keys on the Adjustable Keyboard—like its sound-control keys—are very small, with a different shape and feel from the alphabet keys, all of which interfered with my touch typing.

The new curved mouse that ships with the Adjustable Keyboard provides better hand support than the old mouse, but you can buy it separately for $79 list price.—ANN GARRISON



ROBERT PERRY

Apple Adjustable Keyboard, with mouse and keypad

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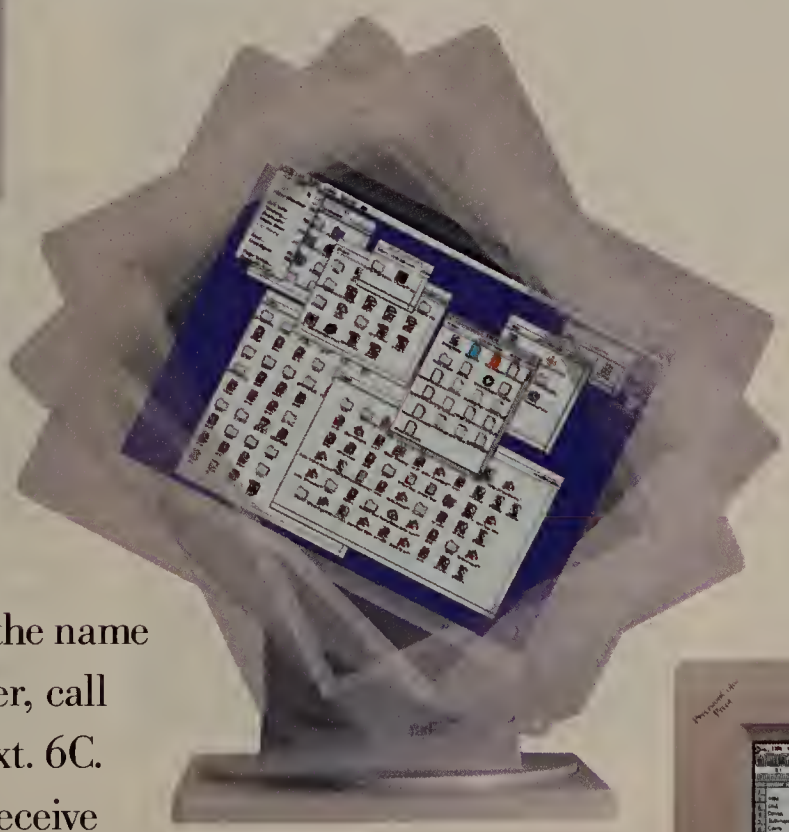
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Color Portable Mac

Macintosh PowerBook 165c

PROS: Fast 33MHz processor; clear and sharp 256-color, 640-by-400 backlit display. **CONS:** Passive matrix screen is dull and has noticeable afterimages on cursor movement and screen refresh; screen refresh is slow; backlight and contrast controls effective only in narrow range. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** With 4MB of RAM and 80MB hard drive $3399.

MW ★★

FOR THOSE OF YOU WHO HAVE BEEN anxiously awaiting a color PowerBook, Apple is attempting to satisfy that need with its new PowerBook 165c. It is as fast as many desktop Macs, has a 256-color screen display, and is easy to set up and use.

But if you're looking to edit color photos in Photoshop, or view your favorite QuickTime movie, you're apt to be disappointed. The 165c's passive matrix display shows a distinct afterimage. It's quite noticeable when you're moving the cursor across the screen. Fast typists will find that characters appear on the screen in a sort of ghostlike, flowing motion. Screen refresh and other display-intensive functions are also beset with these side effects. You'll get used to some of these symptoms, but high-end color work is not the 165c's cup of tea.

And if you've got any color activities in mind for the 165c, before you take it home, you ought to ask your dealer for a RAM upgrade. The time is long past when a full-color Mac can run comfortably with 4MB of RAM—8MB ought to be standard on this sort of product (the 165c can use up to 14MB of RAM). If you've got any desktop publishing duties in mind, you'll find yourself quite constrained until the extra RAM is installed.

Aside from the passive matrix screen, the PowerBook 165c has more in common with the high-end 180 than with the 160. The 165c has the same 33MHz 68030 processor as the 180, and in tests conducted at Macworld Lab provided virtually the same performance in all respects except for tasks related to screen display, where the 165c suffers considerably because of the limitations of passive matrix technology. All operations requiring screen redraw, including scrolling through a document, seem to bog down, making the computer appear much slower than it really is.

The 165c, on the surface, looks almost exactly like the 160 and 180. A small trackball is centered in front of the keyboard, and the all-too-closely-packed keys are smooth and quiet to the touch. To the right of the unit, at the rear, is a floppy drive. The drive is slightly noisy, but efficient in operation, though inserting disks side-saddle may be a bit awkward if you work at close quarters.

On the left is a slide-out battery, which is easily removed and replaced. And if you intend to do heavy CPU- or disk-intensive work, you'll be doing that removal often. You can expect to see a low-power warning on the 165c's screen scarcely more than an hour into your work session. Apple helps matters somewhat by providing a newer, larger nickel-cadmium battery and a fast, 24-watt AC power adapter for quick recharges.

The 8.9-inch, 640-by-400 backlit display is not quite WYSIWYG at 84.7 dpi. The images are clear and sharp when they are not in motion. Colors seem true, if a bit flat, compared with colors on a standard CRT-based desktop monitor. Large, solid areas seem blotchy at times, as well. The display can be adjusted with two sliding controls at the lower right side of the front panel below the screen, but the range of adjustment is narrow. A small movement of the contrast control one way or the other produces an image that is either much too bright or way too dull.

On the positive side, setup of the newest member of the PowerBook family shows why Apple has soared to the top of the heap in notebook computer sales. The 165c is easy to hook up and use. The hard drive comes preformatted with System 7.1, and the HyperCard Player application and Macintosh Basics program installed on the drive will get the most inexperienced novice on the road to productivity in short order (though I can't understand why there's no floppy disk backup for them). The small manual will come as a revelation to the IBM PC convert. You can read it in just a few hours; it's easy to understand, and the troubleshooting section cites the basic pitfalls that one is likely to encounter during day-to-day use.



LUIS DELGADO

The PowerBook 165c from Apple Computer

If trouble does arise, Apple's PowerBook Hotline is an 800-number phone call away. Although you may have to wait a few minutes for an answer, technical support seems friendly and well informed. If your PowerBook should malfunction, you can bring it back to your dealer for repairs, or send it directly to Apple's own repair station, where it will be fixed and sent via overnight carrier to your doorstep. The repair center will even send a specially designed carrier box with which to protect your valuable computer.

In day-to-day use, the PowerBook 165c is a pleasant environment in which to work. Its speedy processor handles most routine word processing and publishing chores with aplomb. And if you stay away from heavy color-related work, you'll find the passive matrix color screen a plus rather than an annoyance. The 165c's relatively affordable purchase price (but still more expensive than comparable PC-compatible notebooks) will please your pocketbook as well.

If you're seeking an active matrix color PowerBook, it doesn't exist, at least not yet, and you could expect to pay more than the price of a 165c for such an animal. But right now, with a reasonable set of expectations, you may find the PowerBook 165c to be worth your consideration.—GENE STEINBERG

MW LAB PowerBook 165c Performance

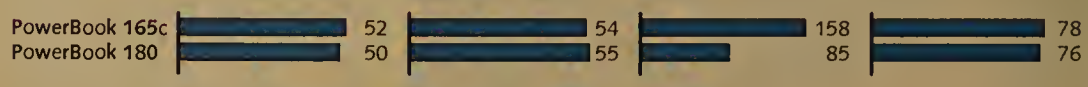
Times are in seconds. Shorter bars are better.

Processor Tasks — We ran tests that included adding and subtracting numbers and finding and replacing words, which depend mainly on the speed of the processor.

Drive-Access Tasks — We ran tests that included opening and saving files, which require the processor to work with the hard drive.

Display Tasks — We ran several tests that included scrolling, which requires the processor to work with the display circuitry.

Math Tasks — We ran several tests that included recalculations involving scientific functions, which depend heavily on a math coprocessor.



The PowerBook 165c, which uses the same processor and math coprocessor as the 180, shows similar performance in every area except display tasks.

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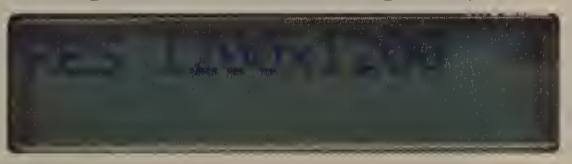


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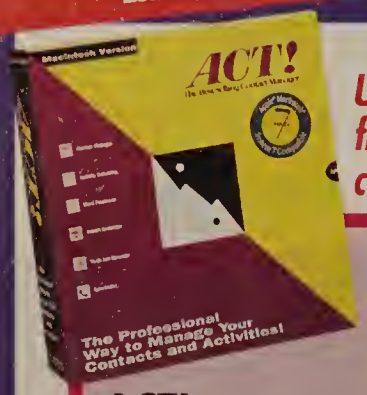
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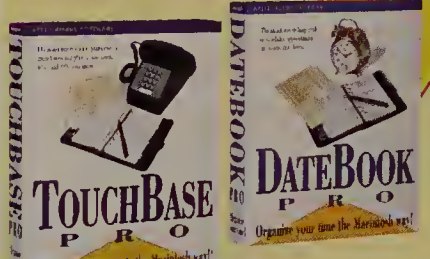
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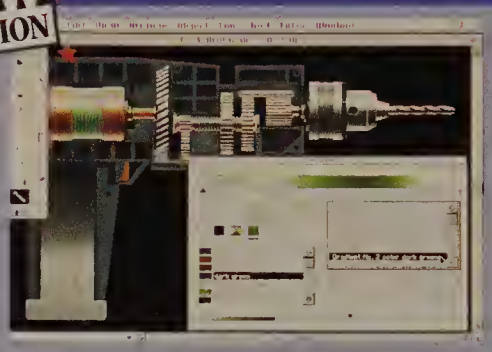


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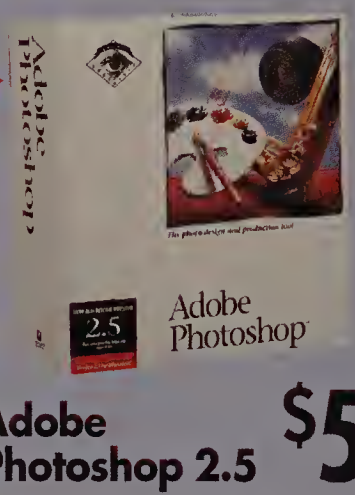
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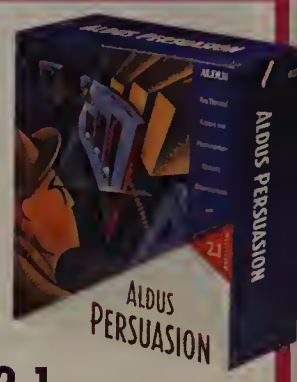
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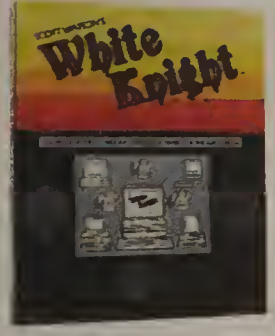


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04573	PageMaker 4.2	$494	$479
05493	Personal Press 2.0	$98	$88
00346	Persuasion 2.1	$324	$309
04190	SuperPaint 3.0	$98	$88
	Amaze, Inc.		
05072	Cathy Daily Planner 2.0	$48	$38
04706	Farside Daily Planner 2.0	$49	$39
06168	Trivial Pursuit 2.0	$48	$38
	Apple Computer		
06297	Apple Font Pak	$68	$53
05432	Mac PC Exchange	$68	$53
	Berkeley		
02785	After Dark	$28	$23
05934	After Dark: Star Trek	$35	$30
	Brøderbund		
03970	Bannermania	$28	$23
03994	Kid Pix	$33	$28
05512	Kid Pix Companion	$24	$19
05479	Mac USA	$34	$29
04328	MacGlobe	$38	$33
04197	Playroom 2.0	$28	$23
05649	Prince Of Persia	$31	$26
04999	Spelunx	$28	$23
04347	Typestyler 2.0 w/ATM	$125	$115
05688	Where In The World Deluxe	$46	$41
	CD-ROM Versions:		
06108	Arthur'sTeacher Trouble	$44	$39
00671	Just Grandma & Me	$33	$28
	Central Point Software		
06763	Anti Virus Mac	$48	$33
03481	Mac Tools	$99	$79
06648	Safe & Sound	$37	$27
	Chipsoft		
06164	MacIn Tax	$49	$39
	Cloris		
05749	Claris Works Version 2	$196	$181
03478	FileMaker Pro 2.0	$268	$258
06290	MacWrite II	$88	$78
06525	MacWrite Pro	$174	$154
	Divo		
00602	VideoShop	$398	$378
	Intuit		
04230	Quicken Mac	$44	$37
	Learning Company		
01856	Reader Rabbit 1	$35	$30
05070	Reader Rabbit 2	$34	$29
04897	SuperSolvers Out Numbered	$33	$28
05126	SuperSolvers Midnight Rescue	$34	$29
05652	SuperSolvers Spellbound	$34	$29
02593	Talking Math Rabbit	$35	$30
04754	The Writing Center	$51	$41
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00507	123 Mac Upgrade	$298	$278
	Microsoft		
00227	Excel 4.0	$294	$274
02581	Foxbase 2.01	$328	$308
01220	Powerpoint 3.0	$328	$308
04161	Project 3.0	$444	$424
04898	Word 5.1	$294	$274
00567	Works 3.0	$158	$138
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04890	Norton Utilities 2.0	$94	$74
00116	SAM 3.5	$64	$49
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03972	WordPerfect Mac 2.1	$278	$258
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04230	Quicken 3.0	$44
04055	Ragtime 3.1 for system 7	$368

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04893	Microphone II 4.0	$144
04168	DuickMail 2.5.1 10 User	$374
02881	White Knight II	$84

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06319	Aldus Fetch	$195
03478	FileMaker Pro 2.0	$268
02648	4th Dimension 3.0.2	$598
02581	MS FoxBase+/Mac 2.01 Sngl	$328
05323	Userland Frontier 2.0	$184

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00203	Cricket Graph III 1.0	$118
04805	Deltagraph Pro	$198
04806	Drg Plus for Mac 1.0	$124

INTEGRATED

04466	Claris Works	$196
04032	Great Works	$88
00427	MS Office 3.0	$474
00567	MS Works 3.0	$158

MANAGEMENT

06231	ACT! for Mac	$248
03910	Business Plan ToolKit 4.0	$78
06713	Datebook Pro/TouchBase Pro	$89
03456	Fasttrack Schedule 2.0	$164
04949	In Control 2.0	$85
00588	Inspiration 4.0	$178
01159	Mac Flow 3.7	$214
04161	MS Project for the Mac 3.0	$444
04140	MacProject Pro	$398
04720	Nolo's Living Trust	$43

PRESENTATION

00346	Aldus Persuasion 2.1	$324
06299	MS PowerPoint 3.0 Upgr	$98
01220	MS PowerPoint 3.0	$328
06275	Pointwrite	$149
06280	PowerPoint(LaserLightPointer)	$98

SPREADSHEETS

00699	Claris Resolve Competitive Upgrade	$98
00518	Lotus 1-2-3 Competitive Upgrade	$98
00227	MS Excel 4.0	$294
04545	MS Excel Version Upgr 4.0	$94

WORD PROCESSING

05738	LetterPerfect 2.1	$94
04898	MS Word	$294
00596	MS Word Upgrade	$124
03972	WordPerfect 2.1	$278

EDUCATION

05379	Algebra I-Homework Tutor	$49
00671	Just Grandma and Me	$34
05991	KidDesk	$26
03994	Kid Pix 1.2	$33
05512	Kid Pix Companion	$24
05992	Millie's Math House	$32
00577	Miracle Piano	$348
00825	New Math Blaster Plus	$34
00074	Oregon Trail 1.1	$28
01856	Reader Rabbit 1	$35
03800	Sim Earth Planet Sim	$39
06109	SimLife	$38
04251	Swamp Gas Visits U.S.	$32
05688	Where in the World is Carmen Sandiego	$46

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06407	A-Train	$42
05607	Capitalist Pig	$34
05071	Crossword Creator 1.0	$39
05550	Davidson's Kid Works 2	$34
06394	Falcon MC	$42
04582	Fun Bundle	$68
01046	Hellcats Over the Pacific	$38
06486	Lemmings	$36
04293	MS Flight Simulator 4.0	$41
00473	PGA Tour Golf	$38
05649	Prince of Persia	$31
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02085	Images with Impact! Business 1	$62
00421	Images with Impact! People 1	$78
04356	MapArt Vol 1: USA & International	$88
05647	MapArt Vol 2: US States by County	$48
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04573	Aldus Pagemaker 5.0	$579
05493	Aldus Personal Press 2.0	$98
05521	Pantone Process Clr Imaging Guide 1000	$61
04056	Pantone Process Color System Guide	$54
04769	Publish It Easy 3.0	$112
04736	DuarkXpress 3.1	$587

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03497	Adobe Type Mgr. 2.0	$58
04049	Effects Specialist 2.0	$94
05964	Fluent Laser Fonts Lib Two	$68
04537	Fontographer 3.5	$258
05969	MacValue Pack	$39
04347	Typestyler 2.0 w/ATM	$125

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04190	Aldus SuperPaint 3.0	$98
00803	Canvas 3.0	$258
04180	Design CAD 2D/3/D	$159
03609	Design Your Dwn Home Architecture	$58
00665	Fractal Design Painter 2.0	$274
03582	FrameMaker 3.0	$494
05969	Mac Value Pak	$39
04073	MacDraw Pro 1.5	$274
03540	MiniCAD Plus 4	$594
05521	Pantone Process Clr Imaging Guide 1000	$61
04056	Pantone Process Color System Guide	$54
01015	Print Shop 1.3	$34
00853	Duick Art Dix CD-RDM	$218
06157	Sketcher	$93
03971	Streamline 2.0	$121

IMAGE PROCESSING

04042	Adobe Photoshop 2.5 for Mac	$548
04121	Aldus Gallery Effects v.1.5	$128
06338	Image Assistant for Mac	$328
00657	Dfoto 2.0	$274

MULTIMEDIA

04670	Adobe Premiere 2.0	$428
05702	Adobe Premiere 2.0 Upgr	$148
05431	Apple DuickTime Starter Kit	$104
00815	Infini-D 2.5	$698
06887	Kodak Photo CD Access Software	$34
00839	MacroMedia Director 3.1	$798
00838	MacroMedia Three-D 1.2	$998
06310	MacroModel	$998
05925	Morph 1.1	$88
04088	Stratavision 3D 2.6	$628

UTILITIES

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03664	Access PC2.0	$59
06602	ALERT!	$114
04955	Auto Doubler 2.0	$58
06166	Essentials for PowerBook	$88
00258	Folderbolt 1.02	$71
03837	I Think 2.2	$424
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03481	Mac Tools Deluxe	$98.98
05899	Magnet 1.0	$88
04046	More After Dark Bndl 2.0	$38
04890	Norton Utilities 2.0	$94
04191	Now Utilities 4.0	$94
05690	PowerMerge	$78
00642	PowerPrint 2.0	$94
03771	Duick Keys 2.1.3	$94
02586	Retrospect 1.3	$146
04768	Soft PC Professional	$198
04541	Soft PC Universal 3.0	$194
05827	Stuffit Deluxe 3.0	$72
04776	Suitcase II 2.1	$49.98
05679	Super 7 Utilities	$62
05433	System 7.1 Personal Upgr Kit	$78

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05628	Axion Serial Switching Device	$128
05354	Full Cycle Battery Charger	$104
09521	Kensington MasterPiece Plus	$98
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06363	Targus Business Traveler Leather	$198
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05719	Fast Cache Duadra700/900/950	$410
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03673	Duadralink	$204
04154	Duicksilver IIsi w/FPU	$268
05250	Radius Rocket 33	$2175
05797	ThunderStorm	$848
00873	TransWarp 040 25 MHz	$1788
05380	TransWarp LC	$389
04732	TransWarp LC 33MHz w/FPU	$529
05381	TransWarp LC w/FPU	$485

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05818	Duadra 950 Video Ram 512K	$68
06734	4MB-60ns SIMMS - 72pin	$188
06729	4MB-70ns SIMMS - 72pin	$168
06756	8M8-60ns SIMMS - 72pin	$388
06755	8MB-70ns SIMMS - 72pin	$348
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05653	1MBX8-80 (Per Tube)	$88
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06587	PerformantzPowerBook Int 14.4 Fax/Modem	$299
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05685	PowerPort Silver	$338
00877	Promethues Ultima Home Office Ext	$378
00062	Prometheus Ultima Ext	$268
04351	Supra Fax Modem Plus	$149
00413	Supra Fax Modem V.32BIS w sft cable	$293
00424	Supra Fax Modem V.32 w/o sft cable	$239
00426	Supra Fax Modem V.32 w/sft/Cable	$289
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00520	Lightning Scan Pro 256	$488
02561	Logitech Scanman Mod32 Digital Darkroom	$295
00670	Logitech Scanman Model 32 w/Catchword Pro	$378
06251	Microtek Scanmaker II	$928
06252	Microtek Scanmaker II XE	$1214
00599	Umax 24bit UC 630 w/Photoshop	$1249

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00578	NEC Mac FG8X Clr Display Interface card	$718
04985	NEC Mac FG 24X Clr Display Interface Card	$1284
07144	NEC Multisync 15 Mon 3FGX	$658
05496	Precision Clr 24XP	$538
04206	Radius Pivot Display	$1298
04899	Radius Precision Clr 20	$2489
06577	Sigma ErgoView 14	$579
00571	Sigma Granite Power Portrait 15 P	$658
06315	Spectrum/24 PDD Plus	$1648
05117	Spectrum/24 Series IV	$872
05123	SuperMatch 17 Mullimode Clr.	$999
06100	SuperMatch 17 T Trinitron Color Display	$1149
05127	SuperMatch 20 Clr Display	$1618
06234	SuperMatch 20 T Multmode Trinitron Clr Display	$2698

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05177	Kensington NoteBook KeyPad	$78
01584	Mac 101E Kyb NEW	$125
02813	Mac Pro KB 105 Plus Kyb	$128
05176	TurboMouse 4.0 Trackball	$106

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05068	Apple StyleWriter Ink Refill Black/2Pak	$14
06701	NEC Silent Writer M95F Printer	$1544
11660	NEC M95FX W/Postscrip Fax	$2075
04096	TI PS 17 Laser W/Apple Talk	$1198
00409	TI Microlaser Turbo	$1598
06859	TI microWriter PS23	$898

NETWORKING

05475	AppleShare 3.0.1 Server	$998
05128	Shiva LanRover/L	$598
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00321	Etherprint Plus 4 Dev EPD400	$598
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04491	Shiva NetModem E Thin/BNC	$1478

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05849	NEC CD Express Mac w/CDR 25 (#CDX25M)	$438
05650	Radius Video Vision	$2098
05114	Spigot + Sound Pro	$1188
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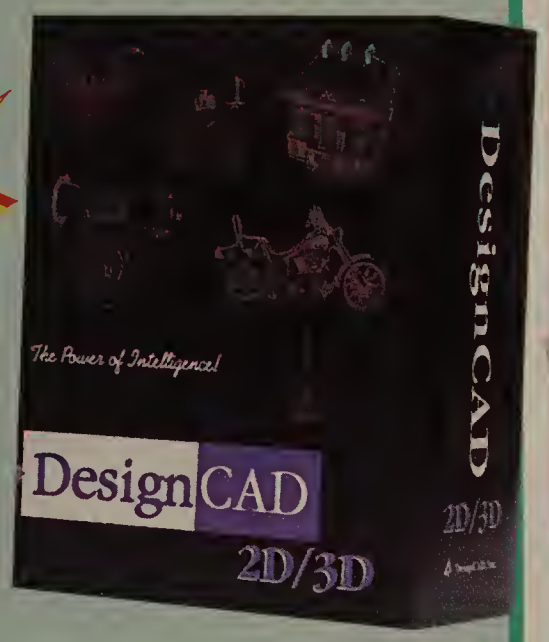
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3-D Illustration and Rendering Program

Alias Sketch 1.5

PROS: Nominal upgrade fee; supports shapes with holes; excellent surface-fitting and positioning controls; lets you specify refractive quality of materials; lets you specify different smoothness settings for different objects. **CONS:** Same old counterintuitive navigation tools; badly implemented environmental-mapping function; no type tool; no time estimate during rendering cycle. **COMPANY:** Alias Research (416/362-9181). **REQUIRES:** Mac IIci; 8MB of RAM; hard drive; color monitor; System 6.0.5. Recommended: 68040-based Mac; 24-bit video board; 12MB of RAM. **LIST PRICE:** $995.

MW ★★★★

ALIAS SKETCH'S SINGULAR INTERface lets you draw in true 3-D space rather than relying on static top, front, and side views of a model. And like the 2-D draw kings Adobe Illustrator and Aldus FreeHand, Sketch excels at the creation of fluid curves.

Unfortunately, the first version was marred by incomplete support for imported objects, slow drawing and rendering modes, and counterintuitive navigation tools. Sketch 1.5 not only addresses most of these issues—the exception being navigation, which isn't any less mind-boggling than before—but it also breaks new ground in the value department. The product still lists for a cool grand, but registered users of version 1.02 only have to part with $25, roughly enough to cover the disks and the docs. Quite frankly, Sketch 1.5 is one of the best upgrade values this tightwad has had the pleasure of reviewing.

Faces and Textures

LIKE ANY GOOD ILLUSTRATION PROgram, Sketch 1.5 can now handle shapes with holes, which it calls faces. These include both objects imported from 2-D draw programs and objects created inside Sketch. In the name of flexibility, Sketch lets you separate polygons into separate faces, thus allowing you to assign different textures and holes to, say, each side of a cube. You can also erase breaks in the outlines of faces to delete holes, change holes into filled surfaces, and so on. Among the objects that Sketch imports as faces is text. Sketch still lacks a type tool, but it does support the holes in imported letters like *A*, *B*, and *D*, so you lose nothing when importing EPS files in which text outlines have been converted to vector-based paths.

Sketch 1.5 offers two new varieties of mapping functions, one good and one bad. The projection-mapping feature is a real effort saver, enabling you to wrap a bitmapped image (called a material) onto multiple surfaces at once rather than laboriously mapping one object at a time. To ensure that the material fits like a glove, the program provides superb positioning controls so that you can align labels and patterns with little or no guesswork. The bad seed in the surface-fitting family is environmental mapping. Rather than offering real environmental mapping, as found in ElectricImage Animation System, in which the program projects background elements onto a model from several different angles and averages the results, Sketch requires you to render the scene as it appears to the model, and then wrap this single perspective around the model. Elements that appear in front of the model frequently reflect onto its backside. It's pure bunk.

A New Render Contender

BUT SKETCH HAS SIGNIFICANTLY SPEEDed up its ray-tracing capabilities. Ray-traced reflections still take more time to execute than blue-light special environmental maps, but the effect is well worth the wait. In Sketch 1.5, you now have the option of specifying a refractive index, which is a numeric value that controls how light bends when shown through translucent material. Higher values equate to thicker materials. You can select from a few rather arbitrarily named presets like Water and Crystal, or you can enter a custom value.

If you've ever used a 3-D draw program, you probably know what it's like to sit through a ten-hour rendering cycle only to find out in the end that you forgot to correctly set an essential parameter. To help eliminate this problem, the new Sketch lets you assign smoothness values to models in the wire-frame drawing mode that are separate from the smoothness values in the rendering mode. This means you can cruise through the drawing cycle and still render very smooth shapes, all without switching the setting in between. You can also specify the smoothness of individual objects; thus you can heighten the smoothness of a certain model in the wire-frame mode or introduce jagged objects into the background or foreground of an image.

During a rendering cycle, Sketch displays a message telling you the percent of the image that is complete and the number of scan lines left to render. The message badly needs a time estimate, both during the rendering cycle and after it completes. If you prefer to do your rendering outside of Sketch, you can export to Pixar's RIB format. For those who communicate with the AutoCAD crowd, Sketch 1.5 exports to DXF and IGES.

Sketch 1.5's enhanced modeling capabilities and revamped rendering capabilities go a long way toward legitimizing its claim as a 3-D illustration program. Sketch still needs a type tool. More important, it needs to restructure its navigational capabilities. But there's no disputing that this is a tremendous and reliable upgrade, a heartening example of a company listening to its users and delivering on its promises.—DEKE McCLELLAND



DAVE SPANGLER AND TOM MIDGLEY

Date with a Gargoyle This 1240-by-960-pixel image took Alias Sketch a modest five hours to render, despite four light sources, an abundance of ray tracing, and a refracted night sky.

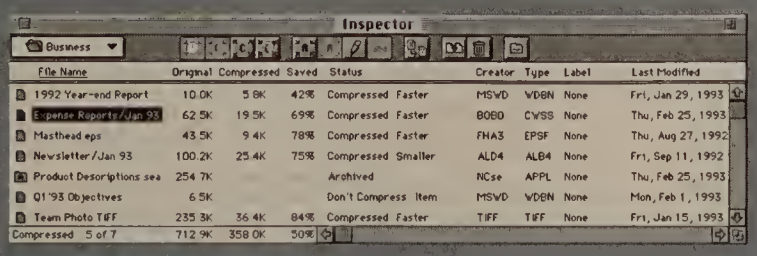


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Effects for QuickTime Movies

VideoFusion 1.0.1

PROS: Excellent selection of special effects; many effects can be customized. **CONS:** No titling feature or audio fade; manual and user interface are occasionally obscure.

COMPANY: VideoFusion (419/891-1090).

REQUIRES: Mac II; 5MB of RAM; hard drive; System 7. Recommended: Math coprocessor; color monitor. **LIST PRICE:** $649.

MW ★★★

MOST MOVIE CREDITS INCLUDE A list of special-effects personnel that's longer than the list of actors. Now, VideoFusion brings special effects to the tiny screen—that is, QuickTime movies.

VideoFusion's effects are applied to all or part of each QuickTime movie clip or PICS animation file you import. The effects fall into several categories, from simple tinting to dynamic effects that let you tumble a movie across the screen. You can save the altered movie in QuickTime format, in VideoFusion's own format, or as PICS or PICT images.

Commands in VideoFusion's Filter menu let you do things like sharpen or soften a movie, zoom in or out, spin an image, warp an image as if it were on a sheet of rubber, or add shadow or emboss effects. VideoFusion lets you use Adobe Photoshop or Aldus Gallery Effects plug-in filters and its own built-in filters.

The program also lets you combine movie clips in various ways via the Combine menu. (If you're combining two movies of different lengths, VideoFusion adds frames to extend the shorter clip.) Transitions create a blend from one scene to another—the familiar fades, wipes, dissolves, and so on. A Composite command overlays part of a foreground movie on a background movie by means of a mask. As a simple example, you might import a PICT graphic of a black keyhole shape and use Composite to view your movie through a keyhole. You can achieve more complicated effects as well, using imported animations or QuickTime movies as traveling mattes. You can use the Blend command to superimpose one movie onto another, as if you were combining two photo negatives. One of the most impressive Combine effects is Chroma Key, which lets you select certain colors in a foreground movie to be transparent, so a background movie shows through. I had great fun placing a businessman at his desk on a buffalo-stampede background.

If you like wild effects, the Morph command lets you transform one scene or object into another. This feature works much like Gryphon Software's Morph program; you apply control points to distinctive features in a starting and ending frame (eyes, nose, and mouth in a face, for example), and the program interpolates between the two images to create a movie that blends them. Or, you might try rotoscoping: save a movie in PICT format, paint on individual frames in a program such as Photoshop, and convert the painted frames back to a QuickTime movie with VideoFusion.

VideoFusion also offers a good deal of control over a movie's color. The Color menu's commands let you color a clip as if it were viewed through a piece of colored glass, or apply more sophisticated color effects, starting with a sepia tone and gradually transforming the movie into full color as it plays, for example. VideoFusion lets you use each of the color channels (red, green, and blue) separately. You can convert a color movie to black-and-white, invert colors for a negative image, adjust the brightness of one or more channels to correct the color balance, cycle through colors for a psychedelic look, or apply your own color palette to a movie.

One of my favorite VideoFusion features is the Pan Zoom Rotate command, which lets you move frames horizontally or vertically across the movie window, zoom in or out, or make an image spin or rotate across the screen. You can view an animated sketch to help you visualize what an effect will look like. You can then customize it in the Pan Zoom Rotate window, where you adjust attributes such as the size of the starting and ending frames, the axis of rotation, and how many times the image will spin or rotate.

VideoFusion offers three views of your project: Storyboard shows the first frame from each QuickTime movie clip you've imported; Player lets you play a movie straight through or view it frame by frame; and Time View shows a strip of individual frames and the movie's audio track. Choosing a command from the Color, Filter, or Combine menus brings up a dialog box with sliders or other controls for customizing the selected effect. The manual and user interface are generally good, but you'll need to familiarize yourself with the program's terminology—and a knowledge of computer graphics and color terminology wouldn't hurt. The company is fairly conscientious about explaining basic concepts; still, VideoFusion is not a program for the casual user.

VideoFusion is not for the casual Macintosh, either. The program's manual states that "VideoFusion places significant demands upon your Macintosh." No kidding. Although 5MB of RAM is required, 8MB or more is recommended, as is a math coprocessor. And as with other programs that compile QuickTime movies, with VideoFusion you will have plenty of extra time while a movie is being created.



Spin Control With VideoFusion, you can spin a movie across the screen as it plays. Rotation is only one of the many effects that you can apply to QuickTime movies.

Do you need VideoFusion? If you want to have a comprehensive set of customizable special effects, yes. But bear in mind that Adobe Premiere 2.0 offers its own suite of special effects, many of which are similar to VideoFusion's. Like VideoFusion, Premiere offers transitions, filters, masks, color adjustment, rotoscoping, and even a warp option. If you want to go beyond Premiere's effects capabilities, you could use VideoFusion as a complementary program, creating clips with various effects and incorporating them in a Premiere movie. If you can't afford both Premiere ($695 list price) and VideoFusion, you'll have to decide which is more important to you: a wider variety of special effects (VideoFusion) or a comprehensive movie-editing environment (Premiere). While you can combine numerous clips into a finished QuickTime movie with VideoFusion, Premiere is the better moviemaking program, with its ability to position multiple video clips in separate tracks, create titles, and fade audio in and out. You might want to consider CoSA's After Effects, a $1295 special-effects program aimed at the professional video market. After Effects excels in layering numerous movies together, lets you add multiple key frames to an effect (VideoFusion only lets you specify start and end frames), provides background rendering, and offers high-quality output options.

VideoFusion is not cheap, but its effects are generally impressive, and most offer a wide range of customization options. If you can't live without spinning logos and superimposed shots, VideoFusion is an excellent addition to your QuickTime movie tools.—ERFERT FENTON



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Drafting Program

Blueprint 4.0

PROS: Excellent, affordable drafting. **CONS:** Minor interface quirks. **COMPANY:** Graphsoft (410/461-9488). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** $295.

MW ★★★★

COMPUTER-AIDED-DESIGN PROGRAMS are often intimidating. Hieroglyphic tool icons, arcane menu commands, and thick, complicated manuals are a daunting combination. And CAD programs can be expensive, too. There's nothing like shelling out thousands and discovering you've bought a puzzle.

Blueprint, Graphsoft's entry-level 2-D drafting program, is a wonderful antidote to the complicated-CAD-system blues. And it's affordable. Blueprint is a full-fledged drafting package with professional features such as polylines that can combine lines, Béziers, and arcs; the ability to produce fillets and chamfers; definable dash styles; dimensioning and tolerancing; and "smart" walls.

Blueprint is the drafting component of MiniCad 4.0, without the 3-D capability, programming language, or built-in spreadsheet of its older sibling. The result is a clear, straightforward interface that conforms to Mac conventions—not always the case with CAD programs. The new menu bar is more logically organized; a Data Display bar provides information on objects and permits keyboard entry in conjunction with mouse-clicks; rulers and scroll bars are finally included; and a new floating palette lets you select color, pen, fill, line-weight, line-thickness, and end-cap attributes.

The Mode bar, which offers prompts and displays tool modes and modifiers, is an excellent idea but is not always consistent—it's sometimes unclear where a tool modifier ends and a new tool begins. For example, the various ways of creating circles (by radii, by points, and so on) are tools, accessed via Tool Palette pop-ups. However, you access different methods of building polylines from the Mode bar. The Mode bar should display all tool modes and modifiers to resolve the inconsistency and add utility to the bar.

Blueprint has a SmartCursor that informs you of a tool's proximity to possible snap points, letting you join or align objects precisely. I confess to having had a certain ambivalence about this feature when it first appeared in CAD packages. But Blueprint's SmartCursor is unobtrusive and genuinely helpful. Its responsiveness can be calibrated, and the on-screen hints can be toggled off or on.

Blueprint 4.0 also adds full dimensioning and tolerancing, features sorely lacking in the previous release. You can now apply standard, chain, baseline, ordinate, angular, and radial dimensioning to any of seven international standards. The ability (sometimes criticized) to set dimension-line attributes separately from those of regular drawing lines is a good feature that helps maintain a consistent dimensioning style.

Blueprint provides a clear and accessible method of organizing and traversing drawing layers. A pop-up on the Data Display bar lets you change layers or access the layer-editing dialog box. A similar mechanism is available for classes, a way of organizing objects by category across layers.

The symbol library function is well conceived. Symbols are objects or groups of objects stored for repeated use. In addition to convenience, symbols offer file-size benefits, since only one copy of the symbol is present in the file regardless of how many times it appears in the document. If you edit a symbol, the changes are reflected in the document. Symbols can also be converted back to objects or groups of objects, facilitating the creation of symbol variations.

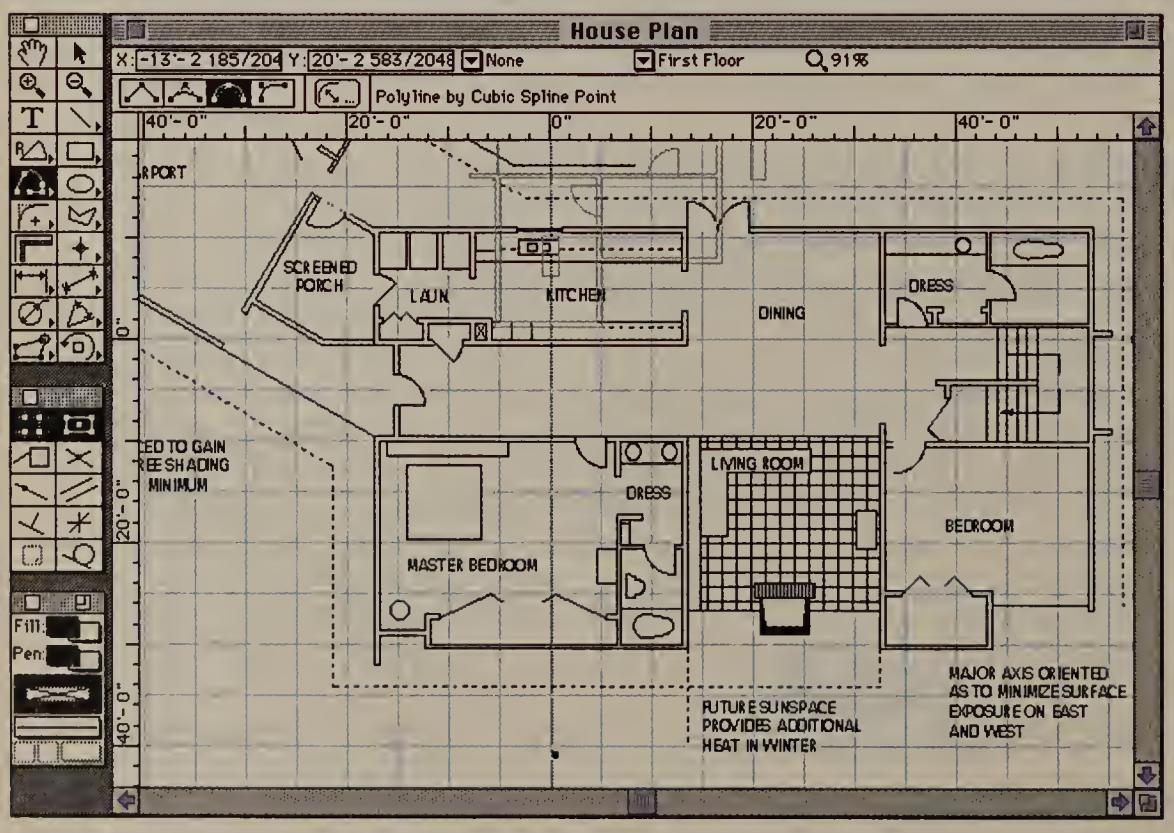
Blueprint stores symbol libraries with their associated documents, but the symbol-selection dialog box, accessible from the menu bar, lets you access libraries from other files and move symbols to the current document or a dedicated library document. This method is acceptable, but the ability to simply save symbols into document-independent libraries would be better. However, if the symbol-selection dialog box were a floating palette, you could make a series of selections. Currently you must pull down the menu selection for subsequent selections. A ⌘-*key* sequence to open the palette would be nice, too.

Although Blueprint is a general-purpose drafting tool, it's well adapted for architectural use. A Smart Wall tool produces wall objects that can have cavity lines and fills denoting material specifications. For example, when a window symbol is applied to a wall, the symbol automatically orients itself with the wall and the wall trims itself to accept the symbol. Delete the symbol, and the wall fixes itself—nice. Wall objects can be ungrouped for editing, but doing so transforms them into "dumb" objects that cannot be reconstituted into walls.

Blueprint imports and exports standard PICT object files, EPS, and files that conform to 2-D Release 11 format DXF (Drawing Exchange Format). It can also import PICT bitmaps as graphic objects and it supports TrueType and PostScript fonts. The manual, a well-organized reference and a tutorial with six short, practical lessons, has all the information you need to get started.

Blueprint is not the final word in drafting, but it's an excellent value—a lot of performance for the price. A terrific choice for novice computer drafters looking for affordable tools, it's powerful enough to serve professionals who appreciate the value of simplicity.

—CARLOS DOMINGO MARTINEZ



Smart Walls An easy-to-use interface, full dimensioning, and "smart" walls are among the improvements in Blueprint 4.

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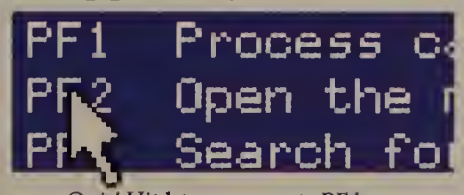
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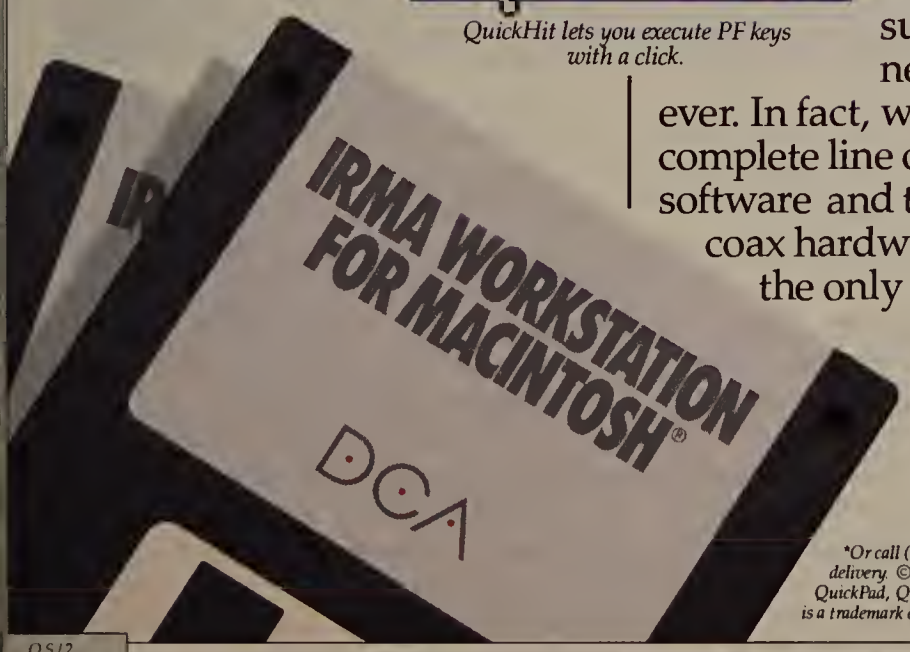
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Interactive 3-D Modeling

Virtus WalkThrough 1.1.3

PROS: Modeled objects instantly visible in rendered view; modeling tools easy to use.
CONS: Walking speed slows with large models; needs better snapping capabilities; problems importing concave objects. **COMPANY:** Virtus Corporation (919/467-9700). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.4. Recommended: Mac II; 4MB of RAM; hard drive.
LIST PRICE: $495.

MW ★★★

VIRTUS WALKTHROUGH PROVIDES instantaneous, interactive access to rendered 3-D scenes. Unlike canned animations, WalkThrough does not constrain you to predetermined paths. At any time in the design process, you can simply move the mouse and travel through the model at will.

WalkThrough is not for detailed modeling. However, for roughing out design elements, quick massing studies, or the preliminary analysis of interior spaces, it's wonderful. Version 1.1.3 adds new tools that skew, scale, and lock objects; a tape measure for gauging distances; interface enhancements; full System 7 support; better import/export capabilities; and faster rendering.

You build models using WalkThrough's Design and Walk views, two different but tightly integrated windows into the 3-D environment. You create and edit objects, in the Design views, a collection of drawing windows similar to those of 2-D drafting programs. The top view of the model is the default, but you can move to front, rear, bottom, and side views with ⌘-*key* sequences.

Drawn objects automatically appear in all open Design views and as shaded 3-D constructions in the Walk view. As you travel through the model in the Walk view, the Observer, a symbol denoting your viewpoint, moves around the Design view, showing your location.

When a Design view is active, WalkThrough's floating palette holds tools for creating objects, organizing drawing layers, setting lighting, and editing object surfaces. When the Walk view is active, the palette displays controls for viewing the model and recording your walkthroughs. A slider bar, calibrated to mimic the settings of 35mm photography, controls the focal length of your view, and an orientation box shows which direction you're facing.

WalkThrough is a surface modeler that builds the interior as well as the exterior of an object. For example, constructing a room is simply a matter of building a box to the required dimensions. The Observer can travel right through these walls. To the program, the only difference between a wall and a doorway is the shading of the object.

The Modeling Process

THE MODELING PROCESS STARTS WITH drawing tools that produce basic 2-D polygons. WalkThrough extrudes these objects to the depth you specify using movable tabs on the Design view's bounding rulers. With the Add and Remove tool you can add or remove handles on a polygon's edges and stretch the object into a custom shape.

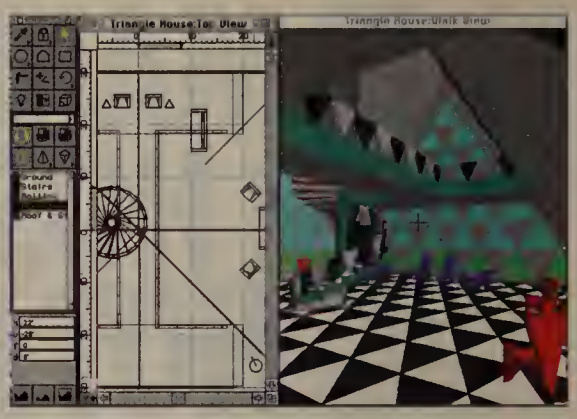
In addition to simple polygons, WalkThrough can build complex objects such as domes and pyramids, using its Inflation (extrusion) modifiers. However, WalkThrough is particular about overlapping objects—they confuse the program and don't render properly. To join two shapes, as you might for a series of rooms with dividing walls, you must precisely align the mating surfaces and nail them together with the Connect Surfaces tool. Aligning objects can be irksome; better snapping capabilities would help.

More drastic shape-editing is possible in the Tumble Editor, a Design view mode that lets you directly modify extruded 3-D objects by rotating (tumbling) selected objects to any orientation. The Slice tool lets you carve off sections of an object and automatically covers the object with a new surface. The Tumble Editor keeps track of the slices, so you can restore the object. And slices can be pasted onto other objects, simplifying the creation of several sliced objects. However, you can't edit several objects together, such as when you need to slice two shapes and join them.

The Surface Editor lets you alter the appearance of individual surfaces and create surface features, 2-D polygonal objects attached to other surfaces to represent such elements as windows, doors, or carpeting. Modifiers let you set whether surface editing is visible on one or both sides of the object. If you locate the Observer near the particular surface prior to editing, you can see results in 3-D perspective, without leaving the editor.

WalkThrough's renderings are simple flat shadings but can be virtually any color on 24-bit displays. In addition, WalkThrough can produce and tint transparent and translucent objects, allowing for some interesting effects.

The Lighting Editor lets you control the appearance of an object's interior surfaces by applying an unlimited number of ambient and directional lights. If no lights are specified, the object's interior takes on the lighting characteristics of the World, the entire modeling area. The default World lighting is a single ambient source; you can change the World light to directional, but WalkThrough cannot produce shadows.



Triangle House WalkThrough lets you interactively examine 3-D models as soon as you've drawn them. The Observer (⏲) shows the location of your viewpoint on the plan.

WalkThrough exports in 2-D and 3-D DXF, Claris CAD, and MacDraw II formats. A SnapShot option also lets you export images in EPS, PICT, PICS, and QuickTime formats. You can import 3-D DXF files from other modelers, but WalkThrough has an aversion to concave objects that present difficulties beyond those common to DXF transfers—often it's better to simply start over.

If you wish to walk through previously drafted 2-D designs, you can place Claris CAD, MacDraw II, and PICT files as templates in the Design view. Yes, you must reenter the geometry, but given how differently WalkThrough and drafting programs handle objects, direct transfers would likely require equally extensive, manual cleanup.

WalkThrough is not suited to detailed modeling, but it's versatile enough to produce large and complex constructions. Of course, see-through objects and lights increase WalkThrough's computational load. Add too many of either, and your walk can become a crawl.

The improved manual is generally helpful, but could be better organized and more comprehensive. Although WalkThrough is not difficult to learn or use, you do need to adjust to its modeling style. The Design and Walk views are complementary—using them concurrently enhances the design process. And be aware that WalkThrough is not perfect; sometimes it just quits, so save early and often. Even with that caveat, however, WalkThrough is an excellent value and worthy of your attention. Its interactivity can change both how you design and how you think about design.

—CARLOS DOMINGO MARTINEZ



If 600-dpi laser printers are the "new standard," we're a couple hundred steps ahead of the competition. With a full 800 x 800 dpi resolution, the TurboPS/880p from NewGen Systems puts out nearly twice the dots per square inch. And almost twice the number of gray levels. Not to mention our proprietary Image Enhancement Technology for the best text, line art and grayscale printing available. Suddenly, "competitive" products pale in comparison.

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End users circle 74 on reader service card

Dealers circle 75 on reader service card

Small-Business Accounting

BestBooks 1.0

PROS: Highly integrated; simple operation; easy setup; double-entry bookkeeping without the jargon. **CONS:** Skimpy, task-oriented documentation. **COMPANY:** Teleware (201/586-2200). **REQUIRES:** Mac Plus; hard drive; System 6.0. **LIST PRICE:** $99.

MW ★★★★

IN A STRAIGHTFORWARD, UNINTIMIDATING manner BestBooks integrates the standard bookkeeping functions of accounts receivable, accounts payable, and general ledger. BestBooks avoids bookkeeping jargon by using more-intuitive terms, such as *from* and *to* instead of *credit* and *debit*. Nevertheless, the program maintains a solid accounting foundation by recording your transactions in standard journals using accepted double-entry bookkeeping methods.

BestBooks doesn't include inventory accounting and payroll, but it can print paychecks after you enter payroll data. In addition it can memorize paychecks and print them on any recurring basis, with or without manual modification at each recurrence. Likewise you can schedule other recurring checkbook, sales, and purchase transactions. Users of BestBooks are unlikely to miss the complexity of inventory accounting.

You can set monthly budgets in BestBooks for your income, expense, and other accounts. The program helps you figure an account's budget by converting your quarterly or annual budget numbers to monthly equivalents, optionally adjusting each month by a fixed amount or a percentage. BestBooks can track income and expense-account activity for jobs, departments, or other profit centers you define.

BestBooks compiles dozens of bookkeeping reports—trial balance, profit and loss, and so on—many in multiple variations (for instance, balance sheet plain, with budget analysis, with last-year analysis, or with 12 monthly subtotals). You can see one report at a time on screen, save it to disk as a text document and open it in a word processor or spreadsheet, or print it. The program offers extensive formatting and style controls for reports, checks, invoices, shipping labels, customer statements, and other forms.

BestBooks organizes bookkeeping activities in several command centers such as checkbook, sales and receivables, and purchases and payables. An interactive work-flow diagram in each command center correlates certain transactions with the journals they affect. Multiple passwords let you control access to different combinations of windows.

Setting up a new data file is simple and well documented both in the manual and on the screen during the setup process. You pick an initial list of accounts (BestBooks provides preconfigured lists for 31 types of small businesses), and enter some simple company information. You can customize the list of accounts at any time, enter opening account balances, and enter sales and purchases that were pending at setup time. BestBooks can import data in text format from another accounting program or in Quicken Interchange Format (QIF) from Intuit's popular Quicken personal-finance program.

You enter payments and sales on data entry screens that look like real-world checks and invoices. The entry screens for deposits, purchases, and transfers are more generic, but are less intimidating than a ledger sheet. The program assists you in making these entries by looking up accounts, customers, vendors, and salespersons by name. You enter the first part of the name, press tab, and BestBooks fills in the rest. If BestBooks finds more than one match, it displays a scrolling list from which you make a selection. This list is in a large window that obstructs the transaction entry window; a smaller lookup window or palette that you could leave open at the edge of the screen would be more useful.

A special window summarizes pending business activities. From there you can pay bills, write recurring checks, and record pending sales individually or in batches, and you can export the addresses of delinquent customers to a word processing program for producing a batch of dunning letters.

Documentation is a weak point. The manual and on-screen help adequately describe how to operate the program, but they tell you little about applying the program in your business. They include no explanation of individual accounts, no tutorial that demonstrates typical workflow, and very little cookbook-style instruction.

There's little to criticize except the documentation, and its weakness only means you may need some help from a bookkeeper or accountant at first. You need to know a little about bookkeeping to use BestBooks, but you don't have to be an experienced bookkeeper or accountant. BestBooks is an excellent value and a good solution for one user who needs more than a checkbook program but can get along without inventory accounting and payroll calculation.—LON POOLE

Astronomy Software

Voyager II

PROS: Enormous astronomy database; deep-space observation points. **CONS:** Some knowledge of astronomy required. **COMPANY:** Carina Software (510/352-7328). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. Recommended: Mac II; color monitor. **LIST PRICE:** $159.95.

MW ★★★★★

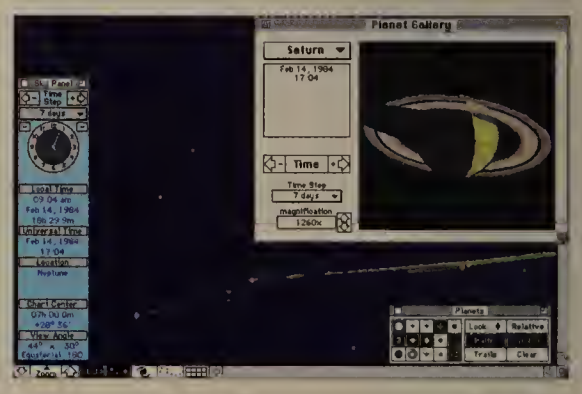
IF YOU ARE FASCINATED BY A BRILliantly lit, star-filled sky, you need to know about Voyager II. In a firmament of mostly faint and forgettable astronomy programs, Voyager II is a supernova.

Voyager II lets you observe the universe from any location on Earth, any planet in the Solar System, or any point in space within 200 astronomical units (1 AU equals 93 million miles, the mean distance from Earth to the Sun), and at any moment in time from 3600 B.C. to 6400 A.D., a span of 10,000 years.

The core of Voyager II is a database of more than 51,000 celestial objects—larger than the database of any other program. It includes 47,000 stars (as dim as magnitude 8) and 4000 deep-sky objects, such as galaxies, quasars, and X-ray sources. Additionally, there are the planets of the Solar System, the major moons of Jupiter, hundreds of comets and asteroids, and even several major interplanetary spacecraft, such as Voyager and Galileo.

Click on an object in the Sky Chart, and Voyager II opens a data window. For example, star data includes type, distance, magnitude, and location coordinates. Should you lose the object in the star field, clicking on a button on the data window flashes a circle around the currently selected object. Or you can add a customized ID label to the display. Alternatively, the Find and Center command

continues



Into Deep Space Looking from Neptune, the Voyager I and II spacecraft (in green) streak past Saturn, one heading into deep space, the other toward Uranus.

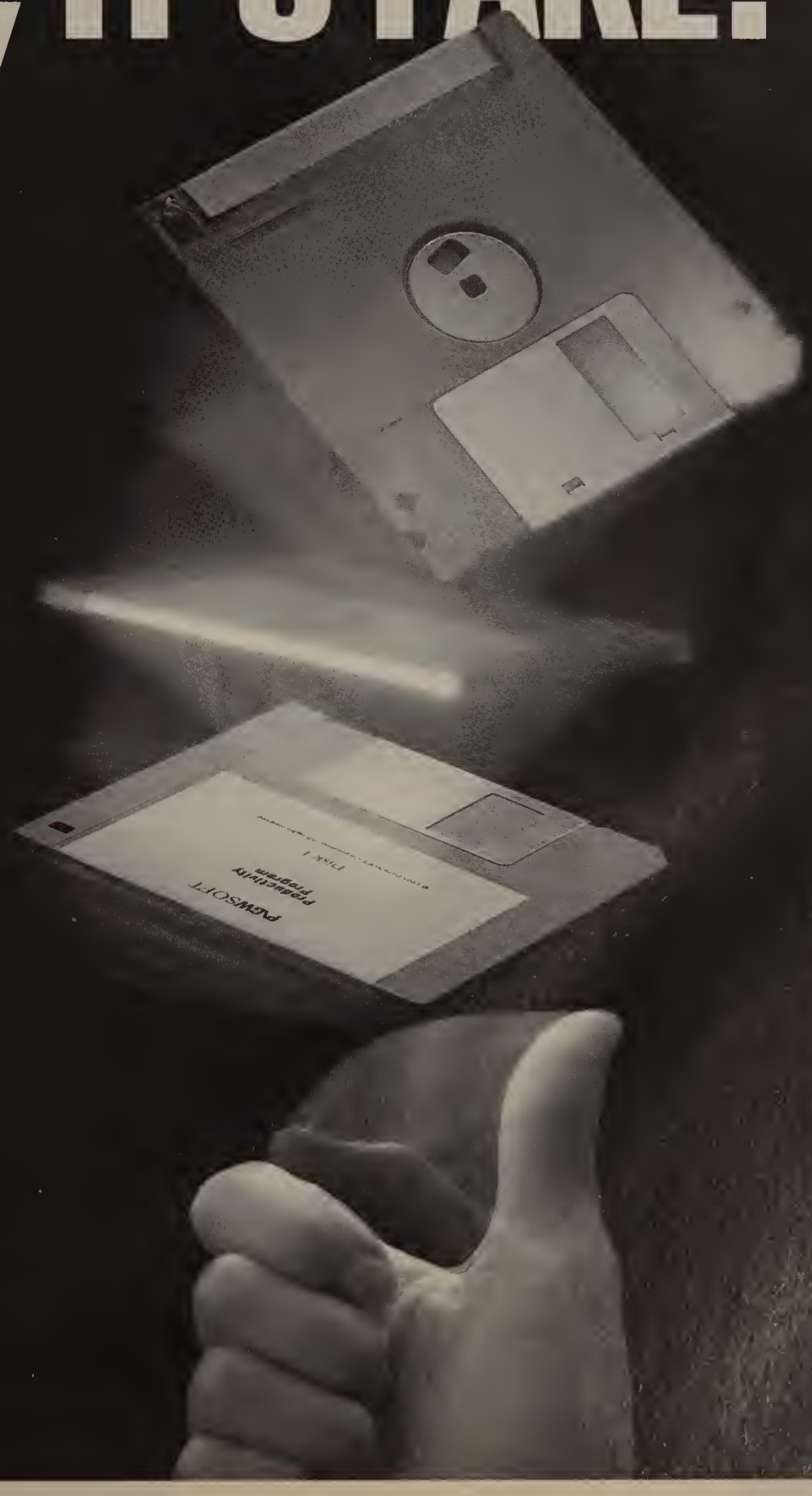
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Selling or copying software without authorization is against the law, with severe criminal and civil penalties including imprisonment of up to five years, fines of up to $250,000, or both. If you suspect the sale or use of pirated software, call the BSA Anti-Piracy hotline:

(800) 688-BSA1 (2721)



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lets you search the database using character strings and zero-in on an object in the Sky Chart.

Voyager II also includes a selection of astronomical phenomena (eclipses, comet visitations, planetary occultations, and so forth) that can be loaded and played. Naturally, you can create and save your own settings. You can even introduce new objects and define their orbits—launch your own probes.

Voyager II's database is so large that it's unwise to display it all at once. The screen gets too cluttered and program response slows down. However, excluding lower-magnitude stars or narrowing the view angle keeps the number of on-screen objects manageable.

Data sets with 210,000 stars from magnitude 8 to 10; 6000 deep-sky objects; 28,400 variable stars; and 20,000 double stars are available separately. Just drop them in Voyager II's data folder—but if you do, a Mac II is recommended.

If an object has an associated PICT image, you can click on its frame in the data window and the photo appears—a window into the actual universe. Voyager II comes with 32 images of planets and deep-sky objects. You can purchase disks with extra photos of planets, galaxies, and Milky Way clusters and nebulae.

The Planet Gallery is a wonderful new addition. In a separate window, each planet and its major moons can be observed in a detailed, animated display that reflects the viewpoint selected in the Sky Chart. For instance, take a look at Jupiter from Saturn. The Solar Neighborhood window offers a 3-D interactive display of our sun's 300 closest neighbor stars, at distances from 5 to 40 parsecs (1 pc equals 3.26 light-years) in space.

Improved from Voyager 1.2, the Sky panel is now a floating palette that provides quick access to dialog boxes for setting time, location, and viewing angles. When you're out in space, Sky-Panel buttons can transport you to other coordinates. Voyager II's addition of color lets you customize the display and imparts clarity to the Sky Chart.

You need a basic astronomical foundation to derive the program's full benefit. The manual explains basic concepts, and has a glossary and a bibliography.

But I've only scratched the surface; Voyager II has too many features to list here. It can even operate in conjunction with motorized telescopes. Voyager II is unequivocally the best astronomy program you can buy. A robust astronomical reference, Voyager is used by many academic institutions, but it's so entertaining you'll want to stay after school.

—CARLOS DOMINGO MARTINEZ

Print Utility

DynoPage 2.0

PROS: Greatly simplifies printing of booklets and double-sided pages; numerous preset page layouts; Printchooser utility enables you to switch printers without using Chooser.
CONS: Doesn't support PostScript graphics; buggy drag-and-drop printing feature; incompatible with some popular applications.
COMPANY: Portfolio Software (408/252-0420). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. Recommended: Laser or ink-jet printer. **LIST PRICE:** $89.95.

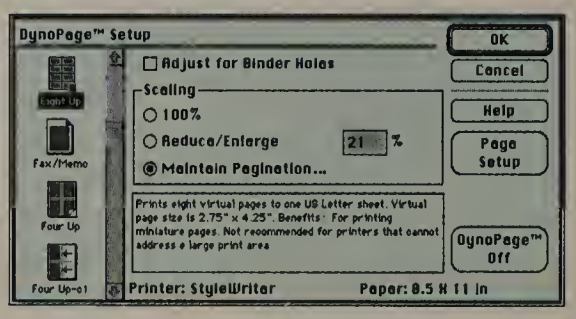
MW ★★

IMAGINE TYPING A STANDARD DOCUMENT in your word processor and then—without adjusting a margin or reformatting a paragraph—printing the whole thing as a pocket-size booklet, with double-sided pages properly numbered, collated, ready to fold and staple.

You can do just that with DynoPage, a print utility that beefs up the humdrum options Apple's standard printer drivers offer. DynoPage intercepts the Mac's regular Print and Page Setup commands and lets you print documents from most applications in a variety of custom formats—as booklets, brochures, organizer inserts, or in many other alternative layouts.

Unfortunately, DynoPage performs erratically and has a few limitations that seriously hamper its usefulness. For one, it is incompatible with such popular programs as 4th Dimension, Publish It Easy, and version 4.6 and earlier of MacWrite. Even more serious, it does not fully support PostScript graphics—a fact virtually ignored in the documentation.

DynoPage 2.0 comes with more than 100 preset page layouts, with options for tiling up to 16 of your original document's pages onto one letter-size sheet of paper. For example, you can apply layouts to produce thumbnails (16 pages per sheet), business cards (8 per sheet), or index cards (4 per sheet). DynoPage also contains layouts for Filofax, Day Runner, and other popular organizers. (Portfolio sells perforated, hole-punched laser paper to match several of the layouts.)



Laying Out the Options In the DynoPage Setup dialog box, you can choose from dozens of page layouts in the scrolling field of icons at the left. Select an icon to display a brief description of the layout.

Each layout gives you the option of maintaining your current pagination or letting DynoPage reflow your text to fit the new format you've selected. When you select Maintain Pagination, DynoPage simply reduces each full page in your original document to squeeze it into the selected format. Alternatively, you can specify the exact percentage at which you want DynoPage to reduce text and graphics before reflowing them into the new layout.

One of DynoPage's greatest strengths is that it allows for hassle-free double-sided printing. Select the Double-Sided check box in the Print dialog box and DynoPage makes your printer skip every other page when printing a document. When all the front sides have been printed, the program pauses so you can flip the pages over and run them back through to print the reverse sides.

Another great feature—new to version 2.0—is an option that reduces your document's pages and lays them out in double-sided format, so that you can fold the finished letter-size sheets and staple them as a booklet. DynoPage handles the hard stuff—like figuring out which pages go on the back of which sheets to make the whole thing fit together properly.

Most of DynoPage is convenient and easy to use, but some commands seem counterintuitive. For example, when using the half-page layout, you have to choose landscape orientation in the Page Setup dialog to yield miniature pages with a portrait orientation—very confusing. When problems with the program arise, the documentation is only marginally helpful because it has no index.

And there are problems. In addition to DynoPage's numerous incompatibilities, for System 7 users there's a serious glitch in the drag-and-drop printing feature, called DynoPage Drops. Dragging any document onto a Drop icon in the Finder should automatically open that document and print it according to DynoPage instructions you've saved as a Drop file. If this worked, it would be quite handy. As it turns out, documents created in Microsoft Word refuse to print correctly using the Drop method.

DynoPage ships with one nice bonus—Printchooser, a control panel that enables you to toggle DynoPage on and off from the menu bar and select a printer without using the Chooser. It's especially convenient for fax-modem users who have to select the fax-modem driver as a printing device before faxing a document.—JOSEPH SCHORR

INTRODUCING NEW COOLSCAN.™

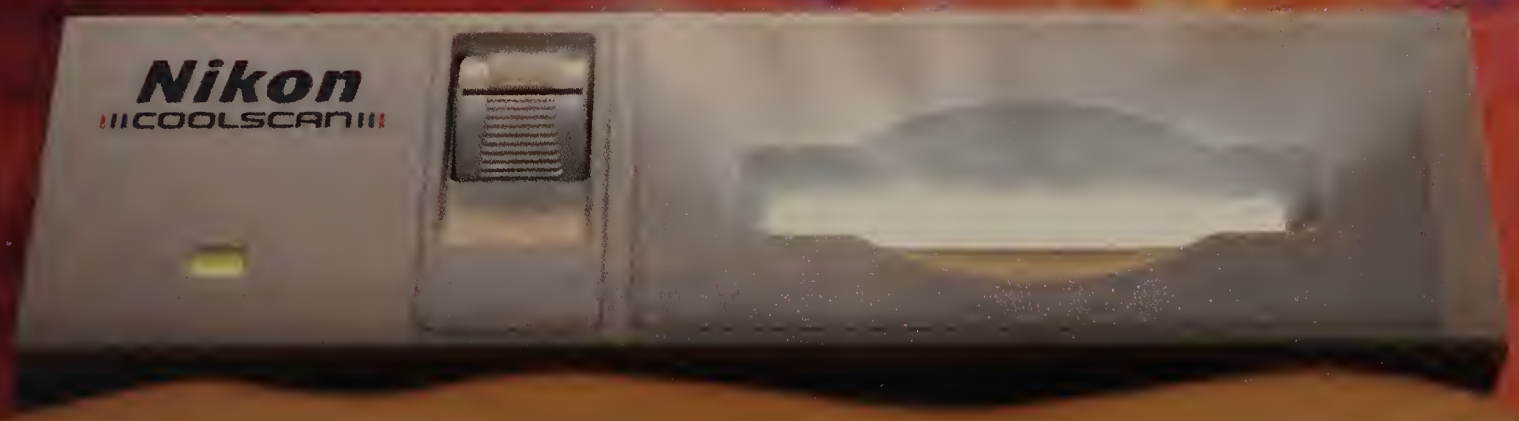
TO BE A GIANT AMONG SCANNERS, YOU DON'T HAVE TO BE BIG. OR EXPENSIVE.

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ELECTRONIC IMAGING

Circle 328 on reader service card

PowerBook Utilities

Billy Steinberg's PBTools 1.0.1

PROS: No-frills PowerBook management; cool keyboard shortcuts; exemplary technical support provided by live human beings, not voice menus. **CONS:** Requires separate utility for file synchronization; elementary password-protection easily defeated. **COMPANY:** Inline Design (203/435-4995). **REQUIRES:** Macintosh PowerBook or Duo; 2MB of RAM; System 7.0.1. **LIST PRICE:** $99.95.

MW ★★★

THE PROLIFERATION OF MACINTOSH PowerBooks and Duos has brought forth a number of new utilities to make these neat little machines run more effectively. The biggest need is power management, and the newest utility is PBTools, published by Inline and created by programmer Billy Steinberg (no relation). PBTools packs some basic features of PowerBook management into one control panel.

The main window of the control panel gives you a choice of clicking on an icon or selecting from a pull-down menu to access its four features. These include PowerWatch, which lets you decide how information about battery life is displayed; SafeSleep, which lets you set a very elementary form of password protection for your computer; PowerControl, which provides features to manage battery use; and PBKeys, which allows you to choose keyboard shortcuts to access different features.

The cornerstone of PBTools is PowerControl. Through it, you decide when your computer will sleep, when the drive will power down, and when the backlight will dim. You have separate adjustments for running on battery power and on power from an AC outlet. You can also opt to turn AppleTalk off, to conserve RAM. Although the basic adjustments will provide maximum power conservation for most users, you can easily fine-tune each adjustment to your taste. There's also a Deep Discharge Battery button for reconditioning nickel-cadmium batteries, so they provide full recharging capability.

PowerWatch lets you display an icon for battery usage in the menu bar. When freshly installed, PBTools automatically configures itself for the kind of battery and CPU you have. If you switch batteries, you can choose to display estimated life of the new battery or the old, but you have to remember to change the display when changing batteries—the program doesn't automatically make the selection for you.

SafeSleep lets you decide whether to have your PowerBook display a request for a password or owner information at start-up, or when waking up from the sleep mode. I observed only two drawbacks: If you type the password too fast, the software won't recognize it. And it's just too easy to defeat the password protection, by starting the Mac either with extensions off (hold down the shift key at start-up) or with a floppy start-up disk.

My favorite feature, next to PowerControl, is PBKeys, which lets you set special keystrokes to activate various PBTools features. I was especially pleased with the ability to remap the control and arrow keys to provide the same home, page up, page down, and end functions that are part of the extended keyboard.

The manual offers a set of Strategies that demonstrate how PBTools might be used for different purposes. Microseeds, which developed the product and provides the technical support, deserves special praise for having a live and knowledgeable person answer the telephone. Here's my vote for the old-fashioned way.

PBTools is fast and stable, but it isn't nearly as full featured as the competition. Despite that, if you want basic PowerBook management without added frills or complex menu-bar displays, PBTools may be your cup of tea.—GENE STEINBERG

Spreadsheet

Wingz 1.1ae

PROS: Fast recalc and file input; superior macro language; great 3-D graphics. **CONS:** Awkward Excel file conversion; no 3-D worksheets; no split screens. **COMPANY:** Informix Software (913/599-7100). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** $399.

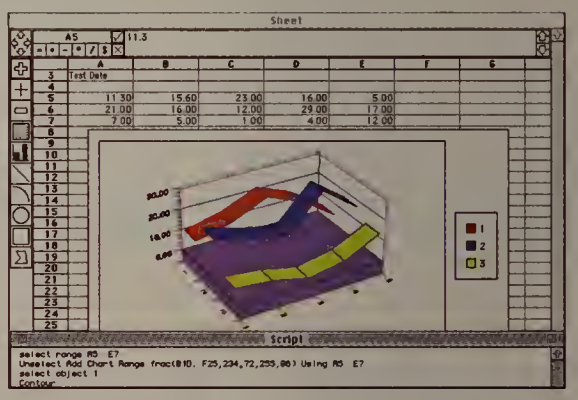
MW ★★★

ALTHOUGH WINGZ NOW HAS A lower profile than it had a few years back (it was the most flamboyantly promoted product in Macworld Expo history), it has settled into respectable middle age as a business tool with a following among Mac and Windows developers and corporate MIS officers.

If you have acclimatized yourself to Microsoft Excel 4.0's foot-dragging execution and hefty size, a double-click on the Wingz icon provides some surprises. Instead of a grinding process that gradually fills the screen while you watch your own name in a registration box, you get a spreadsheet right away. Recalculation on basic arithmetic spreadsheets in Wingz is about 20 percent faster than in Excel; on spreadsheets with heavy use of math functions Wingz is twice as fast as Excel. As tribute to the feature set of Wingz, successive versions of Excel have copied more of it, notably in the area of 3-D graphics. But Wingz still runs in 1MB of RAM, making it an apt choice if you want some real spreadsheet power on the bargain-priced PowerBook 100 you snapped up last year.

Version 1.1ae fixes some basic file-transfer problems of version 1.0. Besides native, DIF, and Lotus 1-2-3 formats, 1.1ae saves files in SYLK format for cleaner export to Excel. Excel files copied to the Clipboard (in one or another BIFF format, depending on Excel version) can be pasted directly into Wingz. You lose some formatting—headers, footers, outlining, print-area definition, and most print options—and macros obviously won't translate, but formulas translated correctly on 20 test samples. Other small touches are enhancements to version 1.0. Cell borders, page breaks, custom number formats, new macro commands, and object locking/unlocking have been added, but Informix got most of its core spreadsheet features right in the first place, so changes are minor.

Wingz is a competent calculating engine (it's still matrix math champion and tops at linear equation solving) with superior charts. You also get the friendliest macro system ever developed—it's a snap to record a HyperScript macro and attach it to a button on a worksheet. While much of the Wingz code has been ported to Claris Resolve, the original Wingz program is faster and simpler; Resolve's interface modifications make it more like other Claris software but a bit less crisp.

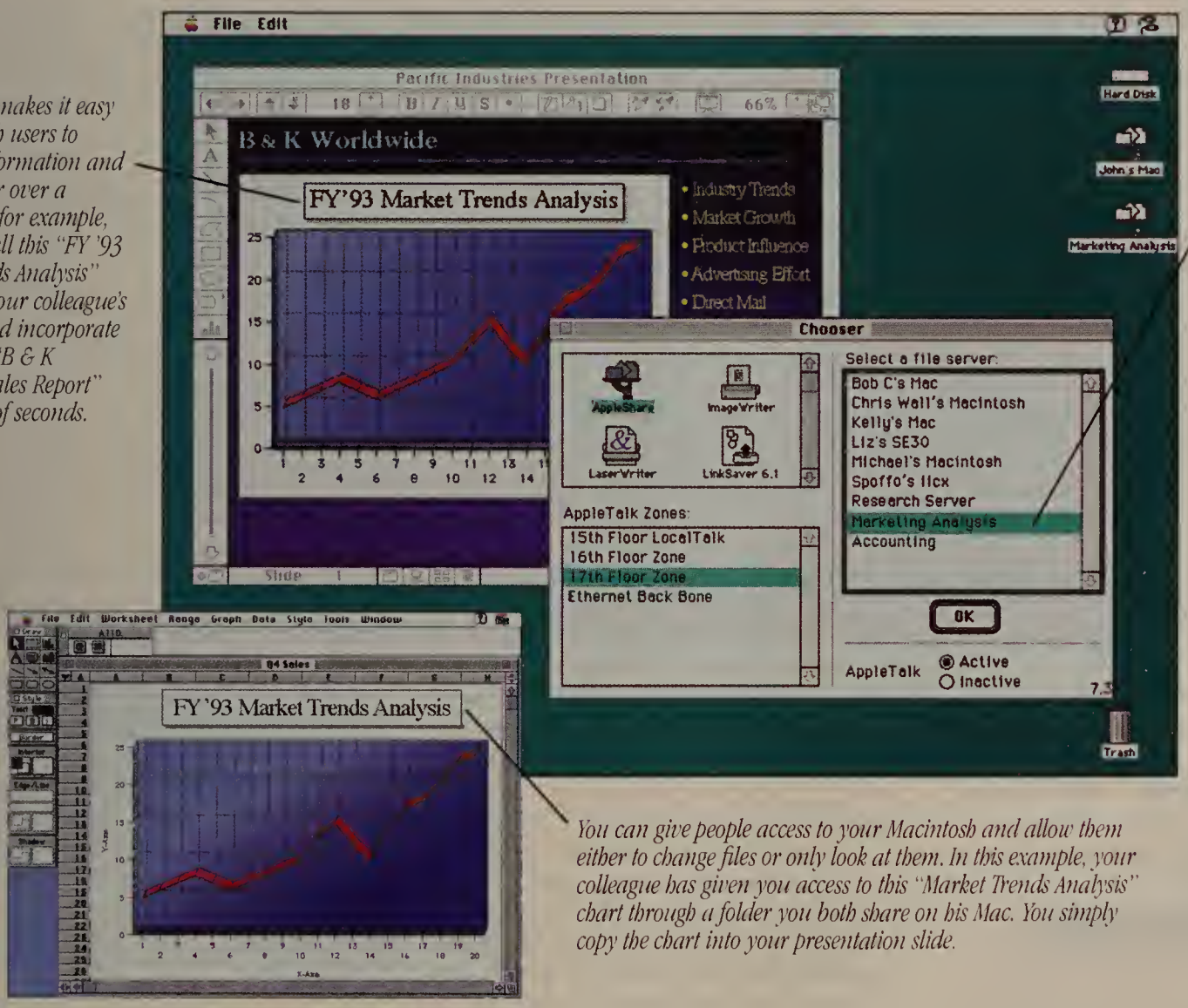


Strike Up the Bands Wingz sets the standard for easy-to-use, visually attractive 3-D business graphics. The lower window shows a section of HyperScript, Wingz's plain-English macro language.

What's missing from Wingz is outlining, System 7 support (balloon help would be nice), real 3-D spreadsheet linking, and of course the host of third-party add-ons and training materials in the world of Excel. If you need a spreadsheet for your own budgeting purposes, or want a low-overhead spreadsheet with advanced-math functionality and have no officewide spreadsheet-compatibility problems, Wingz is an attractive product.—CHARLES SEITER

How to pull together 3 months of research in under a minute.

File sharing makes it easy for Macintosh users to exchange information and work together over a network. So, for example, you could pull this "FY '93 Market Trends Analysis" chart from your colleague's computer and incorporate it into your "B & K Worldwide Sales Report" in a matter of seconds.



Each Macintosh user determines which files are shared with which people. To access the chart on your colleague's Mac, you simply open the Chooser and select your colleague's file server or desktop computer name. Which, in this case, happens to be "Marketing Analysis."

You can give people access to your Macintosh and allow them either to change files or only look at them. In this example, your colleague has given you access to this "Market Trends Analysis" chart through a folder you both share on his Mac. You simply copy the chart into your presentation slide.

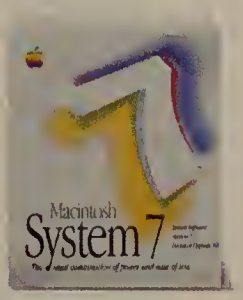
File sharing with System 7.

With System 7™ software and its built-in file sharing, putting together a presentation on your Macintosh® has never been easier or quicker. Even when the research you need for it is in someone else's computer.

Now, despite the fact that you and your colleagues may have different schedules, you can still collaborate on a project over your network. Because file sharing enables you to work with files on each other's computers.

You simply give your associates access to any designated file or folder on your Macintosh, and they can work with your data from their computers.

So let's say, for instance, that your boss walks into your office and asks to see where you're at with your quarterly research summary. But the June findings happen to be on your partner's Mac,® and she's out to lunch.



No problem. With file sharing, you can access your partner's data in moments.

Of course, this is just one of the many ways System 7 can help make you more productive.

It's also just one of the many reasons why 5 million Macintosh users are now working with System 7, as well as with the more than 6,000 applications available that run on it.

For the name of the Apple® software reseller nearest you, call 1-800-732-3131, ext. 500. Or, if you're a current System 7 user, get the System 7.1 Update Kit by calling 1-800-769-APPL, ext. 250.

And see how easily System 7 can give you the power to pull your work together fast. The power to be your best.®

Apple®

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Relational Database

Helix Express 1.0

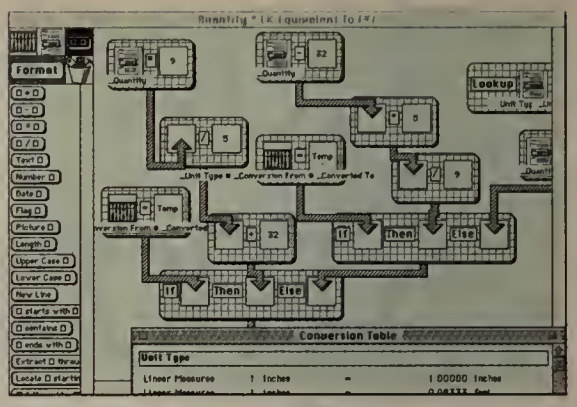
PROS: Includes working-model databases; binary-large-object support uniquely useful; includes network server and client software. **CONS:** Still fairly slow; error-tracking still awkward. **COMPANY:** Helix Technologies (708/205-1669). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** $439.

MW ★★★

HELIX EXPRESS IS THE SUCCESSOR to Double Helix, the oldest surviving Mac relational database (it even survived its original vendor, Odesta). Helix is one of the most distinctive database products ever developed. This package makes one major addition to Helix's structure and includes a useful set of working-model databases and a copy of Helix Express Server/-Client.

The major addition is the document data type, which can be of any size (in Helix this type was given the name Binary Large OBject to generate a cute acronym). This is a unique feature: a document can be a Microsoft Word file, a file from another database, a QuickTime movie, or even a Mac application itself, which can then be launched within Helix Express. This feature offers all sorts of possibilities that can't readily be programmed in other databases, including the development of database applications that manage their own interactive user training. BLOB was originally the key feature of the rather expensive Odesta Document Management System—there's a little document-manager application in Helix Express—and one can hope that the reasonable price of Helix Express will encourage developers to be innovative with this special capability.

The model databases range from a basic contact manager to an all-stops-pulled-out restaurant database. The contact manager you can use right away (it's competitive with simple commercial products), but the three-function business manager and the restaurant database are most useful for learning to make simple relational database modifications and for studying advanced Helix features. Another element of the Helix Express bundle that's well worth studying is the developer's database. Not only is it a clean, easily implemented example of a plain-vanilla database, but it also contains the phone number of the Helix expert in your neighborhood. Although you have to buy Helix Express Client licenses at $199 each if you want to run a multiuser system, you can explore the features of the Helix Server/Client software system with the software included in this package.



Plumbing the Depths This concatenation of pipes and sinks is actually the Helix way of implementing what would be a formula showing arithmetic on field values in other databases. Most examples aren't this complex.

Not much has been done about Helix's traditionally leisurely import/export and indexing, but this isn't much of a problem in day-to-day operations. For that matter, performance of all Mac relational databases except FoxBase+/Mac is scandalously slow by the standards of the rest of the computing world; a more relevant point is that Helix Express lets you code your own easy-to-modify database in days instead of weeks or months. Helix Express, especially at its current modest price, is an attractive choice for a 4-to-20-user relational database for businesses that want active participation in development and modification of a custom data system.—CHARLES SEITER

File-Finding Utility

Alki Seek 2.1

PROS: Scans file names or contents; lets you combine multiple search criteria; text pattern matching. **CONS:** Cannot search in the background; cannot find text in compressed files. **COMPANY:** Alki Software Corporation (206/286-2600). **REQUIRES:** Mac Plus; System 6.0.2. **LIST PRICE:** $39.95.

MW ★★★

OVER THE YEARS, GAPS IN THE Macintosh Operating System have provided developers with ample opportunity to devise innovative utilities. For example, System 7's limited Find command doesn't let you scan for text within files, a restriction addressed by Retrieve It from Claris Clear Choice (408/987-7000) and On Technology's On Location (617/876-0900) (see *Reviews*, November 1992 and June 1992). Alki Software's Seek is a desk accessory that adds a few new wrinkles to finding files.

Recognizing that many users rarely perform complex searches, Seek's simple window includes only two fields, one for a string to look for in file and folder names, and another for text to scan for within files themselves. A menu lets you choose whether to search for files, folders, or both, and buttons on the right let you save and recall searches.

Seven icons at the bottom of the window provide access to additional search options. For example, clicking on the Content icon brings up a dialog box that lets you enter up to two text strings to scan for inside files, and another field lets you specify text to look for within a file's Finder comments.

One of Seek's more unusual features is its ability to look for patterns of text that you define using a special set of symbols. For example, you can search for files that contain three consecutive digits at the end of any paragraph. While specifying search patterns may prove a bit daunting for the average user, Seek's built-in help makes the process easier.

Additional buttons let you scan for items by location, creation or modification date, size, file type or creator, and file attributes. When searching by location, you can specify which volumes to scan, or you can choose any single folder to search inside. If you use Microsoft Word version 5.0 or later, you can also look for files based on Word's summary information. Currently, Seek does not let you search for text within compressed files.

When you're ready to go, a click on the Start button initiates a search. As Seek scans, files or folders that meet your criteria are added to a scrolling list that shows each item's size, name, type, creator, and modification and creation date. You can select multiple items from the list and copy them to the desktop. If you're running System 7, you can also launch or open selected items, or create aliases for them.

Like On Location and Retrieve It, Seek lets you examine the contents of found files. Alas, some files contain embedded formatting information, which appears as extraneous characters in Seek's text view. If you enable XTND file translation using the options menu, Seek can display formatted text. However, Seek does not ship with any XTND translators, and file searches are much slower with translation turned on.

Seek is as speedy as its competitors at searching by file or folder name, but Seek cannot match On Location (which uses an index to search for text within files) when scanning for file content. On the other hand, Seek doesn't require you to index volumes the way On Location does, a real boon if you routinely deal with many different volumes.

Seek is often much faster than Retrieve It at scanning for text within files, but unlike Retrieve It, Seek cannot search in the background while you're working on something else. If you can live with its limitations, Seek is a competent file-finder that will do the job.—FRANKLIN N. TESSLER

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Circle 48 on reader service card

Scientific 3-D Visualization

Spyglass Dicer 2.0

PROS: Nothing else like it; supports all common data formats; supports animation and isosurfacing. **CONS:** Isosurface rendering pushes limits of Mac hardware. **COMPANY:** Spyglass (217/355-6000). **REQUIRES:** Mac II; 4MB of RAM; hard drive; 256-color monitor; System 6.0.5. Recommended: Math coprocessor. **LIST PRICE:** $695.

MW ★★★★

AN OUTSTANDING CHALLENGE IN scientific computation, beyond the sheer amount of power required for large-scale problems, is how to deliver computed output in a form that humans can grasp. With millions of years of evolution behind our visual capabilities but only a few decades' practice at reading printouts, the obvious way to present the volumetric data results of a three-dimensional computation in classical fluid dynamics, meteorology, medical imaging, or astrophysics is to contrive a single-window image that encodes numerical values in a color picture. Spyglass, which has close relations with the National Center for Supercomputing Applications (NCSA), has claimed this area as its own. Spyglass's three scientific-visualization tools—Format, Dicer, and Transform—are the best available for their respective tasks.

Dicer displays a two-dimensional slice through a three-dimensional object—the object being represented in the computer by a data table. Dicer 1.0 was limited to using NCSA-standard HDF-formatted data and a set of code examples for linking the program to the FORTRAN or C code generating the data. Dicer 2.0 expands both the range of usable input data sets and the viewing options. Its data utility now converts MatLab; X Window; and ASCII column and matrix files; and you can easily convert sets of 2-D PICT and TIFF files into 3-D. In display, you can now take a data slice at any angle, and render a 3-D isosurface view with detailed control over object transparency. Dicer also lets you save sets of slices and changing transparency views as animations. By adjusting color tables through a variety of false color choices, you can pick out even very small details. If you can't find something interesting in your data in a Dicer 2.0 animation, there's probably nothing there. You can also now make decently annotated presentation slides of your data, with appropriately scaled coordinates, legends, titles, and control over annotation text.

It's impressive that Dicer 2.0 can draw isosurfaces at acceptable speed on a IIci and even fairly quickly on a Quadra 950. Spyglass's disingenuous caveat "68030 strongly recommended" for the LC and IIsi is misleading; an LC without a math coprocessor is not a suitable vehicle for this program, and 8MB of RAM is a more realistic working minimum for memory than the stated 4MB. But if you're accustomed to getting regular downloads from dynamics simulations on a Cray, chances are you've got the appropriate hardware for Dicer. And since for its intended function this product is really the only game in town, we should just be grateful that Spyglass has done such a good job of it.—CHARLES SEITER



This Is Your Brain . . . on the Mac This figure shows an isosurface view (right) of a magnetic resonance imaging scan of a human head, and two 2-D slices of the same data set (left). It's easy to take different slices using the tools at the left, or to rotate views in the orientation window.

Background Music for Multimedia Presentations

Hi Rez Audio Volume 1.0

PROS: Appropriate, high-quality music. **CONS:** Quirky interface; no documentation. **COMPANY:** Presto Studios (619/689-4895). **REQUIRES:** Mac II; 3MB of RAM; CD-ROM drive; 13-inch color monitor; System 6.0.7. Recommended: 5MB of RAM. **LIST PRICE:** $149.95.

MW ★★★

CANNED MUSIC FOR CREATING BACKground music for presentations is often clichéd, and sometimes it overwhelms the visual part of the presentation. To my pleasant surprise, Hi Rez Audio provides enjoyable music that won't detract from the presentations you add it to. Presto Studios has the balance just right.

I can't be enthusiastic enough about the music. I put the clips into some Passport Designs' Passport Producer presentations (made up of simple backdrops plus a QuickTime clip) and suddenly even a revolving logo with a voice-over seemed more interesting. Hi Rez offers a wide variety of music: 12 new age clips, 7 orchestral, 5 funk, 5 mainstream rock, 5 pop, and 4 acoustic guitar. There are also 3 *gearhythms*—clanging sounds, like metal against metal—and 23 sampled sound effects.

The sampled sound effects are about 10 seconds long and include around-the-home sounds such as a dog barking, water pouring into a glass, a bouncing ball, and footsteps. The music clips vary in length, from 20 seconds to over a minute and a half. Many of the songs are designed so that musical phrases can be looped. However, the sound-editing software you need to do that is not included on the CD. Any sound editor will recognize the AIFF format of the digitized music clips, but you might want to use Macromedia's SoundEdit or SoundEdit Professional, since the Hi Rez Audio music files in AIFF or SoundEdit formats have phrase-change markers that facilitate looping—just select the music between the markers, copy, and paste.

Once you have selected the music clip or sound effect that you want to include in your corporate presentation or digital home movie, you choose the sound resolution. The digitized sound files are available at 11kHz and 22kHz. If you have limited hard drive space and are making an informal presentation, 11kHz is fine. If you need true CD-quality sound or you want to do extensive work on the sample, you should use the sound files in 44kHz Red Book Audio format, though you will need special hardware, such as Digidesign's Audiomedia board, to do so.

I disliked the browsing software included with Hi Rez. When I used Browser to save sound files to disk, Browser created a folder called Hi Rez Audio and saved the sounds into that file regardless of where I chose to save them. The only way I could save sounds directly into my production-sounds folder was to copy the sounds from the CD-ROM myself. Furthermore, Browser modifies the standard Open and Save dialog boxes. As a result, some INITs like the shareware package Open-Wide (which widens the standard file dialog box) behave strangely.

My only other complaint is that the product needs documentation, even if only a short Read Me file.

All in all, even though I have my gripes with the Hi Rez Browser, I thought the music was perfect for creating background moods. Once you're through using Browser to find the right music, you probably won't be concerned with anything but the actual music clip as you edit it and place it in a presentation. The music, after all, is the most important element. So if you have a sound editor and need music for background presentations, Presto Studios' Hi Rez Audio Volume 1 is a great resource that you can use in many ways.
—CAROLYN BICKFORD



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3M Reliability

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Programming Language

FutureBASIC 1.0

PROS: Structured, modular BASIC with full Toolbox, System 7, and assembler support; fast compiler; excellent documentation. **CONS:** Relative isolation of BASIC. **COMPANY:** Zedcor (602/881-8101). **REQUIRES:** Mac Plus; System 6.0.5. Recommended: Hard drive. **LIST PRICE:** $299.95.

MW ★★★★

BASIC HAS ALWAYS BEEN ONE OF THE easiest computer languages to learn, but over the past 15 years it drifted from the mainstream of application development, pushed aside first by Pascal and then by C. Various BASIC vendors have been adding modern graphical-interface programming extensions, getting it ready for the production of real applications. Microsoft's Visual Basic 2.0, for example, is now a serious development tool for DOS machines, and among its 200,000 users is a respectable contingent of commercial programmers. Microsoft's QuickBASIC for the Mac may not be comparably professional, but Zedcor's new FutureBASIC is. FutureBASIC is a complete, easy-to-learn, real-world programming tool.

If you have already discovered that HyperCard really just produces stacks rather than programs, and have a bookmark permanently stuck in the Think C manual's "Learn OOP" tutorial, FutureBASIC may represent your best hope for turning your ideas into a Mac application. First, the language includes very powerful statements, such as EDIT FIELD, MENU, BUTTON, and HANDLEEVENTS, that replace whole collections of individual Mac Toolbox calls. As a result, you can write a real program just a few lines long that will open a text window and allow text to be entered and edited. Second, FutureBASIC programming is centered on the definition of procedures using LOCAL FN, a function type comparable to those in Pascal and C; you can still use GOTO if you insist, but the manuals lecture against this on every page. The manuals also give hundreds of examples (included on disk) of programming in the new local-variables style, and the examples set is complete enough that you can use large chunks of it in fabricating your own application. Finally, program modules can be separately compiled and called with INCLUDE to speed up compilation. There's a proper Project Manager with a Function window.



Not So BASIC FutureBASIC includes facilities, like this Project Manager, that programmers have come to associate with the best examples of Pascal or C compilers.

Completed applications typically opt for compilation with the full run-time package, which adds 40K to the final program but lets the programmer use all of FutureBASIC's powerful Toolbox management commands. There is also a remarkable mini-run-time option that adds only 4K of overhead, but requires that the program use a subset of FutureBASIC and native Mac Toolbox calls only. FutureBASIC also accepts assembly language code, as well as compiled resources written in other languages, and can be used to furnish XCMDs and XFCNs for HyperCard.

Although FutureBASIC is quite new, it's already the subject of articles in the magazine *Inside BASIC* (Ariel Publishing, 509/923-2249) and has become a favorite with commercial developers. FutureBASIC is a wonderful product and deserves more than a basic future.—CHARLES SEITER

BASIC Programming Tools

PG:PRO 1.5

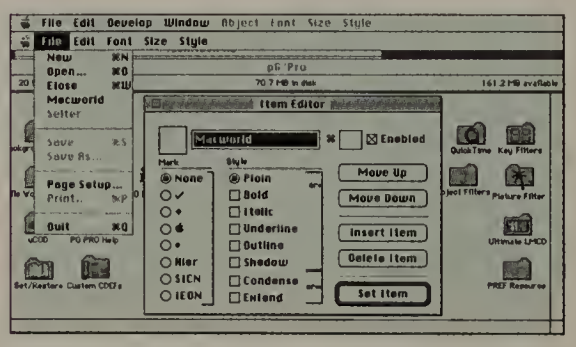
PROS: Amazingly simple instructions; great assortment of tools. **CONS:** Requires programming in Zedcor's FutureBASIC; manual doesn't always match screen. **COMPANY:** Staz Software (601/255-7085). **REQUIRES:** Mac Plus; FutureBASIC. **LIST PRICE:** $169.

MW ★★★★

HOW DO YOU WRITE A REAL MAC interface without writing hundreds of lines of code for each on-screen program element, and without sacrificing control or speed to a huge application shell?

The combination of PG:PRO and Zedcor's FutureBASIC (FB) might be the long-awaited answer, at least for programmers who haven't already contracted to produce a thousand lines of MPW C++ code per week. Designing an application in PG:PRO and FB is a clean process. First, you plan what application commands you want on menus (or buttons, or in dialog boxes, and so forth), you determine the application tools you want on palettes, and you decide on a layout for the windows where the application's action will take place. You then create, in FB, the code resources that correspond to your commands and tools; this is easier than it sounds, since FB gives you plenty of help. Next you create a PG:PRO framework by making straightforward choices from the Develop menu in PG:PRO. Finally, you hook up your FB code to your PG:PRO framework. Staz Software has produced the equivalent of an object-oriented programming (OOP) environment that doesn't require previous OOP experience. This is an amazing accomplishment in its own right, but the speed and compactness of the resulting code are phenomenal for an OOP-based product.

The facilities here for avoiding tedium are truly impressive. Since, for example, you can simply call for standard File and Edit menus (which you can modify with a few choices), it takes about 45 minutes to set up a multiwindow editing program that accepts cut-and-paste graphics, complete with an About box shamelessly claiming that you developed the whole thing yourself. Similarly, since FB is a modern BASIC with a RECORD construct, you can develop a simple flat-file database application in less than an hour. The manual is remarkably clear and entertaining, despite occasional mismatches between text and PG:PRO screen. While it's true that Symantec has done wonderful work with Think C and Pascal, for part-time or beginning programmers the PG:PRO-and-FB combination is a much faster path to creating a working Mac program.



Made to Order Add and subtract menu items in your application with a few clicks in this PG:PRO dialog box. PG:PRO gives FutureBASIC programmers a complete assortment of interface tools.

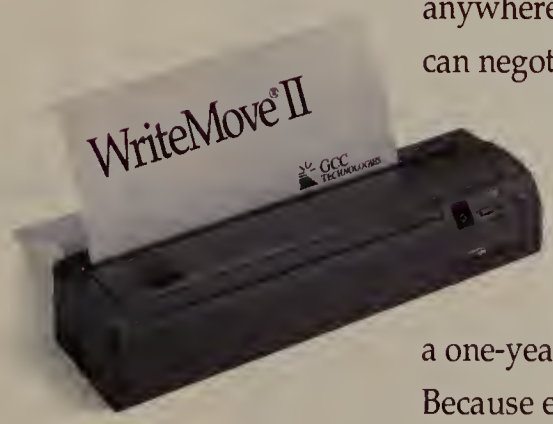
Zedcor and Staz Software have done such a good job that the basic nature of these products isn't a problem—you start to think of BASIC as an easy-to-learn command system for directing Mac interface features. After all, programming languages per se are elementary compared with the complexity of the Mac—the original description of C takes less space than the index to *Inside Macintosh*, and complete versions of BASIC have run in 16K. If you don't have the resources to deal with MacApp, can't stand HyperCard's restrictions and lack of speed, and still would like to develop a custom application, FutureBASIC and PG:PRO are your best bet.
—CHARLES SEITER



MACUSER EDITORS' CHOICE AWARD 1992 FINALIST

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Educational Programming Language

Object Logo Student Edition

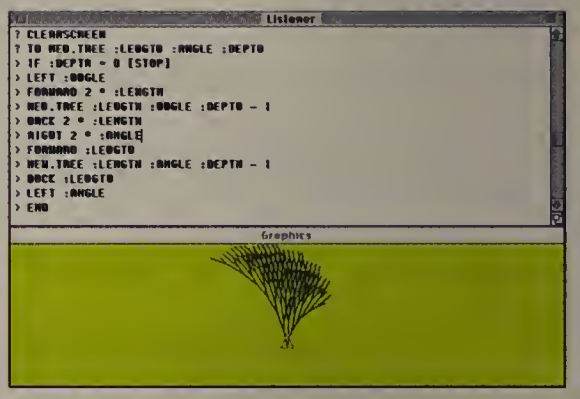
PROS: "Instant gratification" programming; wonderful introductory examples of object programming, recursion, and list processing. **CONS:** Wide variation in conceptual difficulty; shows its age. **COMPANY:** Paradigm Software (617/576-7675). **REQUIRES:** Mac Plus; 24-bit addressing; System 6.0.4. Recommended: 2MB of RAM; hard drive. **LIST PRICE:** $49.95.

MW ★★★

JUST TEN YEARS AGO, IT WAS WIDELY assumed that using computers had something to do with programming. The Mac is the main reason that assumption has been shunted aside. While it fostered easy-to-use applications, it also created new horizons in programming difficulty. Hence, most Macintosh users have never written a line of code, and attendance at classes in Excel undoubtedly exceeds that at classes in all programming languages since the dawn of time.

If you've never written a program, you should take a look at this book-plus-disk package. Although it's aimed at an educational audience of roughly high-school level, it offers a wide-ranging introduction to programming concepts. Logo itself, designed not to tax the attention span of a five-year-old, lets you see something happen for every few lines of code you type. This instant feedback makes sessions very lively; if you can budget an hour or so every night, you could clip through the ten chapters of the book in two weeks and have a very sophisticated understanding of programming concepts to show for your efforts.

Logo is perhaps best known for teaching geometry using turtle graphics (see "Turtle in a Tree")—you type some simple instructions in a text window and the turtle-cursor scrolls around in a graphics window according to your directions. This activity has engrossed many a tyke since the days of the Apple II, but fortunately Logo for the Macintosh takes care of this in a few chapters and then heads forward to debugging, procedures, global versus local variables, list processing (these sections are notably tougher than the rest), and recursion. Although most of the examples are games, the material is serious. The chapter and code bits for object-oriented programming, for example, are ambitious yet exceptionally clear. The package also includes a $60 discount coupon for the full version of Object Logo ($195), if you wish to explore more features or compile your code.



Turtle in a Tree The short section of recursive program in the text window draws the tree in the graphics window. Logo's strong point is generation not just of doodles but also of geometric insight.

You should not, however, confuse practice in Logo with training in a commercial programming language. Like Icon, SNOBOL, Prolog, and Lisp, Logo seldom appears outside of university computer-science departments or other educational enterprises; that's the reason for its old-style teletype syntax. If you really want to give up your end-user status and become a programmer, you'll need to start slogging away in Think C or Pascal and find out how to use the Mac Toolbox. Still, Logo for the Macintosh teaches you how programs work, and it costs about the same as a screen-saver utility. If you have any curiosity about programming, give Logo for the Macintosh a try.—CHARLES SEITER

Math Education

Decimal & Fraction Maze 1.2

PROS: Bilingual English/Spanish version available; complete math curriculum; customizable for classroom or home. **CONS:** Setup and customizing a bit of a maze. **COMPANY:** Great Wave Software (408/438-1990). **REQUIRES:** Mac Plus. **LIST PRICE:** $69.95; bilingual version $89.95.

MW ★★★★

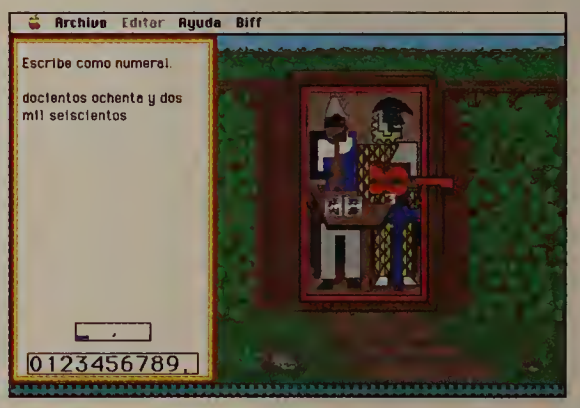
DECIMAL & FRACTION MAZE WEAVES the threads of math curricula from third grade to eighth—along with two levels of adult education—into an interesting and visually stimulating game.

Students enter their name and optional password and then make their way through a maze, either leading a panda with a bamboo shoot or leading a bee with a honeycomb. The goal is to reach the house at the opposite corner of the screen. To open the maze's gates, you must solve problems using whole numbers, decimals, and fractions.

When your bee or panda reaches a gate or other obstacle in the maze, the point of view changes from that of a helicopter to that of a hedgehog. Math problems display in a window on the left side of the screen, and you must solve from two to four problems to open the gates or surmount the obstacles. Then the aerial point of view returns, and you move on to the next obstacle. Each time you reach the house, you're rewarded with items of interest that are added to the attic.

The mazes increase in complexity, and the math problems become more difficult and the obstacles more challenging, with rivers to cross, litter to pick up, ladders to scale in order to jump dead-end hedges, and whirlwinds that change the shape of the maze. The mazes' gates include Japanese screens, Pueblo blankets, and paintings by Diego Rivera and Pablo Picasso. These artistic elements, stunning in color, gently add art appreciation to the mathematics drills.

Whenever a student meets a goal in the curriculum—learning to write decimals, comparing fractions with different denominators, converting fractions to decimals—a Certificate of Achievement pops up, regardless of the student's current position in the maze. A customizing system lets the teacher or parent set curriculum levels and maintain statistics on up to 50 students. Setup and customizing, while not difficult, are slightly mystifying, especially



At Picasso's Portal Brazenly multicultural, the gates are a subtle art education. You can use Get Info at any gate to read information on the artwork.

compared with the game, which is very straightforward.

The program makes good use of the speech capabilities of the current crop of Macs. A bilingual version toggles between English and Spanish, making the program a must-have math tool for ESL and Spanish teachers.

While Decimal & Fraction Maze lacks the white-knuckle excitement that's common among children's electronic amusements, the levels of achievement and the appealing visuals kept the youngsters I know drilling away and enjoying it. Great Wave continues to make some of the most useful educational packages—multilingual and multicultural to boot—at a terrific price.
—RICHARD FENNO

STATISTICA/Mac

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Color Paint Program

Easy Color Paint 3.0

PROS: Minimal system requirements; straightforward documentation. **CONS:** Limited to 8-bit color; amazingly nonstandard interface; awkward zoom function; program does not dither gradient fills. **COMPANY:** MECC (612/569-1500). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** $59.95.

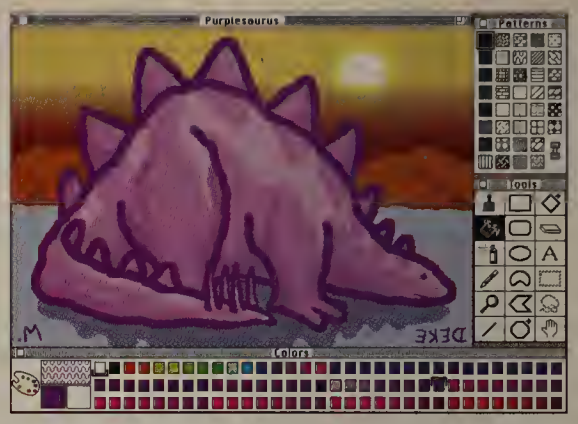
MW ★

HOW BETTER TO SAVE A MEDIOCRE program from extinction than to repackage it as educational software? That seems to be what MECC has done with Easy Color Paint. Except for its oversize tool icons and a Wacky Colors command that enables you to cycle through the palette as you paint, nothing about the program suggests any consideration for young users. Even folks with gobs of painting experience will have difficulty with the program's unnecessarily complex interface. If not for MECC's well-referenced documentation, Easy Color Paint would be a complete washout for the fledgling computer artist.

For a program that purports to be simple, Easy Color Paint is anything but. For example, the document window lacks scroll bars; you have to move around with the hand tool. To constrain ovals to circles and rectangles to squares, you press the option key. If you press shift, the constraint key in almost all Mac programs, Easy Color Paint creates multiple copies of a shape as you drag. If you're looking for the eyedropper—an essential tool for matching colors in your painting—you won't find it in the toolbox. You can access it only by pressing both the shift and option keys. That's handy, but you won't even know it exists if you don't read the manual or the poorly organized online help. (There is no balloon help nor any other form of context-sensitive help.)

Zooming is another botched effort. Clicking on the image with the zoom tool brings up a dialog box that magnifies a tiny portion of your painting. You can make corrections only with a pared-down version of the pencil tool, and you can scroll to another area of the painting only by taking baby steps inside a tiny preview window. Furthermore, there's only one zoom level, 800 percent, versus four in Claris's MacPaint 2.0 (now five years old) and many more in similarly priced color paint programs.

Easy Color Paint's color handling couldn't be much worse. The program isn't smart enough either to work with a monitor that's set to display more than 256 colors or to automatically change the number of colors displayed upon launching. Easy Color Paint can't jumble color dots (also known as dithering) to create smooth gradations, so you end up with banding. And although the program lets you mix colors, the color-mixing commands—with names like Subtract Over and Max—are difficult enough to challenge the most seasoned user.



Purplesaurus Easy Color Paint can't dither to create smooth gradations, so even after hours editing colors one by one, I got color banding.

Easy Color Paint is a program without an audience. For children, there's Kid Pix, one of the most highly regarded and enjoyable programs for the Mac. For casual users, there are inexpensive 24-bit alternatives like Timeworks' Paint It (see *Reviews*, *Macworld*, April 1992) and Delta Tao's Color MacCheese. When you come down to it, this is the first program to make me nostalgic for MacPaint.—DEKE McCLELLAND

Early-Math-Education Software

Millie's Math House

PROS: Good documentation; easy to use. **CONS:** Can't save creations; not enough levels of complexity to keep kids challenged. **COMPANY:** Edmark Corporation (206/556-8400). **REQUIRES:** Mac Plus; hard drive; System 6.0.7. **LIST PRICE:** $49.95.

MW ★★★

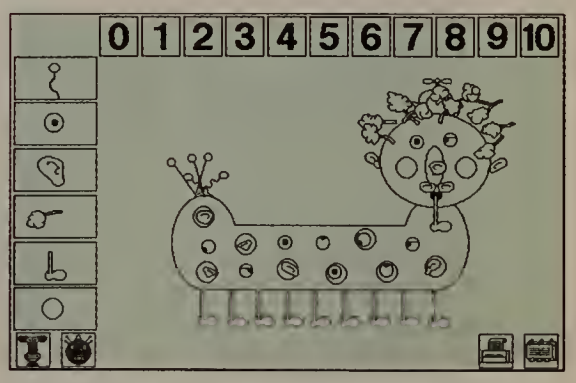
ANYONE WHO'S SPENT TIME AROUND young children knows how numbers fascinate them. Millie's Math House provides a variety of ways for preschoolers to experiment with numbers and counting.

Each of the six rooms in Millie the cow's house offers a different math-related activity. All have an introductory Explore and Discover mode, and all but Build-A-Bug have a more advanced Question and Answer mode, which gives specific directions to follow. To switch modes, just click on the picture frame.

My four-year-old loved Little, Middle, & Big, which calls for selecting the right size shoes to fit three randomly appearing characters. Once she had mastered this activity, she delighted in doing it the wrong way: putting giant cowboy boots on Little (so that only the top of his head was visible) and seeing Big trying to squeeze a toe into one of Little's tiny shoes.

She also enjoyed Build-A-Bug, deciding how many tails or feet to put on the bug-in-process. You can place the body parts anywhere you want, so you can create some weird variations—eyes and ears inside spots, antennae on top of ears, and so on. Though you can print out children's creations for coloring, unfortunately, you can't save them for later use. If your Mac supports sound input, you can record sounds for the bug to make (otherwise, it just giggles).

In Mouse House, children use various shapes to build a house. Frank Lloyd Mouse asks for a shape; click on the correct shape and it automatically snaps to the blueprint. A mode requiring children to drag shapes into place would sharpen their clicking-and-dragging skills and make this a more useful activity.



Build-A-Bug My daughter Daron and I had fun together constructing this silly-looking creature.

In Cookie Factory, Harley the horse asks for a certain number of jelly beans on his cookie. If you click on the jelly-bean dispenser the requested number of times, the jelly beans drop onto the cookie and the horse gets to eat it. Sometimes my daughter deliberately placed the wrong number of jelly beans so that Froggy would get the rejected cookie.

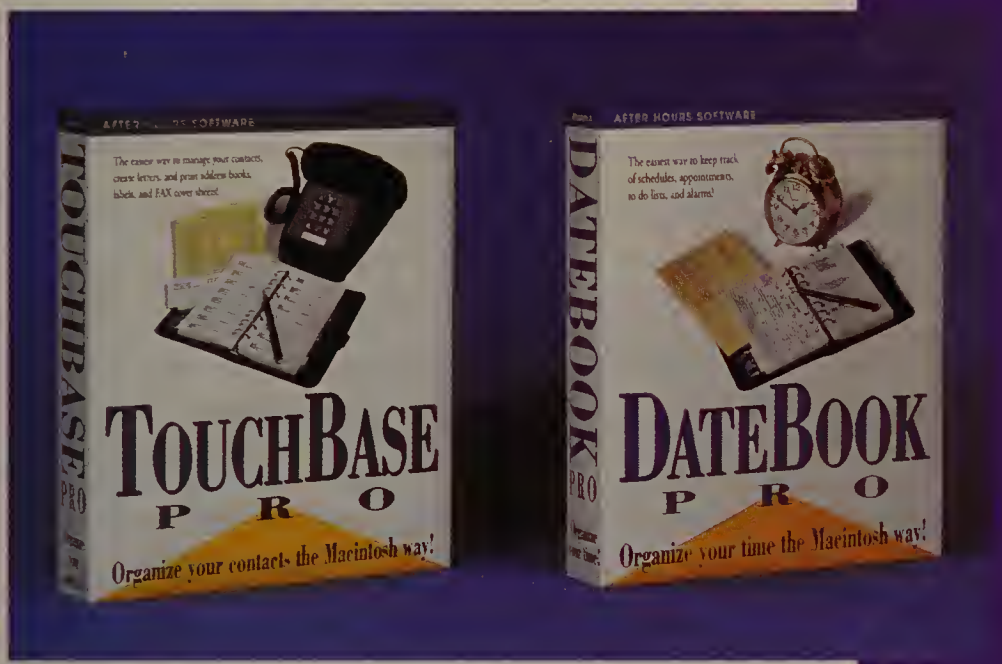
The simplest activity is Number Machine, a cash register whose drawer opens to reveal from one to ten creatures, depending on which key is clicked.

My child found Bing & Boing, which teaches pattern recognition, the most difficult. A three-part pattern is generated from eight different images (a mixture of abstract shapes and animals). Then, after the first two pieces of the pattern are repeated, the child is asked to click on the image that completes the pattern. Perhaps the mix of shapes and animals confused her; at any rate, I had to repeatedly guide her to the right image.

Millie's Math House is engaging and entertaining; however, I'd like the various activities to have more advanced levels and more flexibility. Once a child has mastered an activity, it becomes repetitious. More-challenging levels would keep children in Millie's House longer.—CATHY ABES

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MACWORLD MW EDITORS' CHOICE

One in a series of observations on health in the workplace:

10 million computer users suffer from job-related vision problems annually.

Just how healthy is our corporate environment?

Funny thing about computers. They've made a healthy contribution to the way we do business. Yet they've created a serious health problem that affects 10 million Americans — a problem so widespread that it dwarfs Carpal Tunnel Syndrome in its presence throughout the American workplace.

The malady is Computer Vision Syndrome. CVS for short. And it could have a very *un*healthy effect on your personnel — and your company — for a variety of reasons.

A university optometrist's research.

In the early 1980s, Dr. James Sheedy, founder of the VDT Clinic at the University of California at Berkeley, noted that most of his patients complained of eyestrain, double vision, nearsightedness, and other vision problems directly related to their use of video display terminals.

Wondering if this were only a localized problem, Dr. Sheedy recently conducted a nationwide survey of over 1,300 optometrists. Results? 14% of their patients suffered from similar VDT-related problems.

What to do?

Research has not yet indicated how many CVS sufferers endure permanent symptomatic problems. Certainly, however, CVS poses potential long-term risks to corporate productivity. Yet simple action can significantly reduce these risks.

Doctors across the nation recommend a three-step prevention program. First, all computer users should undergo a thorough eye examination by an eyecare professional. Vision must be corrected precisely since computer tasks are visually demanding. Next comes a survey of users' physical environment to determine proper computer placement and lighting. Finally, the doctors prescribe Glare/Guard® glass computer screen filters to greatly increase contrast and reduce glare — primary causes of CVS.

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Iconomics 101

BY DAVID POGUE

IF YOU STOP TO THINK ABOUT IT, exactly how graphic is the Mac's graphic interface? Let's see. You've got your icons. You've got your Trash Can—well, actually, that's just another icon. You put things into folders—yup, icons again. Hey, come to think of it, icons are the *only* way the Mac's interface is graphic!

Recognizing this critical fact, Apple programmers did a strange and wonderful thing when they designed System 7. Along with such grave and important features as file sharing and DAL (whatever that is), they gave us the utterly frivolous ability to change what our icons look like. If you've never tried this, you're missing a truly wonderful and embarrassingly addictive opportunity. (In a nutshell: use HyperCard or a paint program to draw a new little picture. Copy it. In the Finder, select the icon you want to replace. Choose Get Info from the File menu; press tab or click on the icon in the window that appears; paste. You've just replaced the original icon. This procedure doesn't work with shared files, the Trash Can, or any System Folder folders; and yes, I know you can also use ResEdit.)

Then, too, we mustn't forget the Golden Rule of the Mac: Where there's a feature, there's a market. Both commercial and shareware programmers have rushed into the icon fray, supplying us with a wealth of icon editors, icon animators, and icon palette-makers. I've put all the shareware mentioned here in the Macworld forum of America Online. So get your electronic paintbrushes ready and prepare to make direct icontact.

IconBoss 1.01

IF ICONBOSS ONLY WORKED A LITTLE bit better, it'd be a regular icon *icon*. It's a sweet, easy paint program for System 7 icons (Scott Johnson, $25 requested; 3916-12 Newport Ave., Fort Wayne, IN 46805). Drop a file on IconBoss, and you're instantly in a miniature color MacPaint FatBits window, touching up each dot of the document's icon using basic painting tools. There's even a tear-off color palette to make retouching easier (see "The Boss"). When you've finished doctoring the image, choose Save from the File menu; when you return to the Finder, you'll find the new icon in place.

Unfortunately, I unearthed a few sporadic bugs and one big disappointment: IconBoss edits only file icons, not folder or disk icons. Too bad; changing your hard drive's icon to look like, say, a beanbag chair is one of life's little pleasures.

Icon Editor 1.0

HERE'S ANOTHER CUTE COLOR ICON editor, this one by Troy Anderson ($24.95). This program feels more finished than IconBoss. Icon Editor certainly has more tools—its arsenal includes a straight-line drawing tool, a magic-wand tool for selecting objects, and flipping and nudging tools.

Neither IconBoss nor Icon Editor, however, includes a text tool—a weird omission, since lettering often appears on an icon (the letters *PICT* on a graphics file icon, for example). IconBoss lets you edit all six icons in an icon family (the large and small pix used in black-and-white, 4-bit and 8-bit color modes), where Icon Editor shows only the large-size color one.

But perhaps the biggest strike against Icon Editor is that it doesn't automate any of the icon-replacement process: when you're done editing your icon, you have to manually paste it back into the Get Info box. Real men may actually eat quiche, but real icon editors don't make you replace the icon by pasting.

On the other hand, Icon Editor comes with 11 other shareware-esque utilities for System 7. They're bundled together as a book-and-disk package, Xtras for System 7, by Sharon Zardetto Aker (Addison-Wesley Publishing, 617/944-3700).

I Like Icon 1.0

STEPHEN SONDHEIM ONCE said that a great plot is one whose outcome seems both surprising and inevitable. That's how I Like Icon (Baseline Publishing, 901/682-9676; $59.95) strikes me: surprising, in that it lets you create *animated* icons—actually itty-bitty QuickTime movies that play when clicked on; yet inevitable, given the increasing ubiquity of moving images and sounds in the Mac universe. When you click on an icon that looks like Neil Diamond's head, and it responds by opening its tiny 72-dpi mouth and crooning a line from "Song Sung Blue," you're surprised—yet the event seems perfectly at home on your screen.



Everything you'd possibly want to read about Mac icons

I Like Icon is much more than an icon animator, of course. It's a full-fledged icon painter like the ones discussed above (though it, too, is missing a text tool).

I like I Like Icon's ambition and cleverness; in fact, I like I Like Icon's icon (a hilarious miniature of Mr. Eisenhower's head). Trouble is, I can't share all this joy with my friends; an animated icon on your hard drive ceases to be animated if you give the file to anybody else. ILI is complicated, too, involving numerous windows, ever-changing menus, and an absolute necessity to read the manual. Finally, ILI has some problems updating icons; I could never see the changes I'd made to an icon until I restarted the Mac. I Like Icon is certainly the program for the most ambitious icon-likers, provided its drawbacks don't draw you back.

Icon 7 1.0

ICON 7 (INLINE DESIGN, 203/435-4995; $79.95) offers three substantial improvements over the standard miniature-color-MacPaint type of icon editor. First, there's a smart, intuitive method of accessing the painting window: you just double-click on the existing icon in a file's Get Info window. Second, Icon 7's graphics tool kit includes—*thank you*—a text tool. Third, the icon-editing window provides direct access to the program's library feature, which theoretically makes huge numbers of icons available at the click of a mouse, in the event that your artistic skills aren't quite a match for your icon ambitions.

These handinesses add up to an ingenious, well-designed program that really works. It's amazing how much more you wind up using System 7's icon-replacement feature when the hassle (copying and

continues

pasting from some paint program) is taken away. Icon 7's sole unfulfilled potential is that library feature—a software company obsessed with quality would have provided more than 44 ready-made icons.

Icon Wizard 1.0

IN ICON 7, YOU ENTER ICON HEAVEN BY double-clicking on the icon in a Get Info box. Icon Wizard puts icon-editing tools right *in* the Get Info box. One-click buttons let you (a) make the icon invisible; (b) restore the original icon; or (c) open an elegant color painting window. There is no text tool (sigh), but the painting window offers one-click search-and-replace for a specific color, flipping tools, and pop-up pattern and color palettes. There are Kid Pix–ish sound effects here and there. And ooh, the lasso: for the first time on the Mac, the shimmering line that indicates what you've selected doesn't obscure the edges of the selection.

Icon Wizard is so much drag-and-drop, well-designed fun that it's easy to forget it's shareware. No wonder: the programmer, Mike Samuels, has hitherto written only commercial software hits (After Hours Software's DateBook, for example, and the great battery gauge in Symantec's Norton Essentials for PowerBook). Of course, the nicest part is the price: $22. (When you send your payment, you get a version with even more goodies, such as an icon-library feature.)



The Boss Incredibly, gifted shareware programmer Scott Johnson says he's received only *one* payment for his smooth, almost polished icon editor.

Folder Icon Maker 1.1

THIS DRAG-AND-DROP, ONE-TRICK shareware pony creates a new folder with the tiny image of an icon *inside* the folder icon. So, you drag a Word document onto Folder Icon Maker, and you get a new folder, shaped like a typical folder, but with a teeny-weeny Word document icon centered within the folder image. Ever seen System 7's Control Panels folder? It's the same idea: the little folder-icon graphic helps you identify what's inside.

For all the verbiage this gizmo takes to describe, it's actually quick, smooth, and surprisingly useful. And free (Gregory Robbins, 109 Crocker Ave., Oakland, CA 94610). Folder Icon Maker can also create purple- or gray-tinted *disk* icons. About the only downside I can see to going wild replacing your boring and faceless folders with these new snappy and interesting ones is that now you won't be able to spot the System Folder anymore—it used to be the *only* folder in your hard drive window with a little icon inside it.

(Speaking of other shareware, I also checked out Easy Icon, Icon Maker, Color Bits, and Icon Designer. Downloaders beware: these are older, generally black-and-white programs designed for System 6's more complex icon-editing scheme.)

Visage

IF ICONBOSS ONLY DOES FILES, THEN Scott Searle's shareware program only does disks. It adds your choice of 36 witty color icons to your *disks*, and it works great (9025 61st Pl. W., Mukilteo, WA 98275; $25).

The Upshot

WHAT A HAPPY CIRCUMSTANCE: THE easiest and most efficient icon retoucher, Icon Wizard, is also the least expensive. If a text tool, the ability to edit all six icons in a family independently, and phone help interest you, then consider the clever—but overpriced—Icon 7.

And please: no letters complaining that I've wasted two entire pages talking about dinky little pictures. If you ask me, those tiny canvases communicate a wealth of subtle and important information. Hey—without them, your Mac screen would draw a blank. **m**

Contributing editor DAVID POGUE is the author of *Macs for Dummies* (IDG Books Worldwide, 1992), the Mac thriller *Hard Drive* (Berkley Publishing Group, 1993), and the manuals for Finale 3.0.

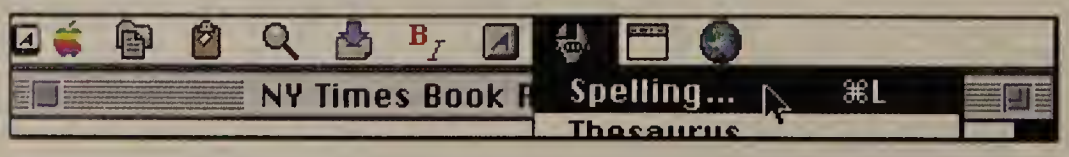
Icons, Icons Everywhere

Icon's aren't just for files anymore. Now they're out there replacing your very menus!

Take the charming Menuette 1.1.1, for example ($15, Robert L. Mathews, P.O. Box 21271, Oakland, CA 94620). This shareware control panel automatically replaces the words *File, Edit, View* and so forth, in your menu bar with little color pics of a file, a clipboard, a magnifying glass, and so on. The glorious online help explains that once you get used to seeing icons in your menu bar instead of words, you'll become more efficient and improve your status in the office. I fell in love with Menuette for a more prosaic reason—all those gol-darned utilities I've been using (Now Up-to-Date, Norton Essentials for PowerBook, Color Switch) add clutter to my menu bar, to the point that there's no room left for my *programs'* menus. Menuette makes room by eliminating the verbiage. (And the credits are priceless. "Concept: Robert L. Mathews. Fiancée: Sandra Forrest. Mr. Mathews' wardrobe provided by: The Gap . . . ")

ClickChange 2.0, just out from Dubl-Click Software (818/888-2068; $89.95), contains a module called Menubar, which does almost exactly the same thing as Menuette. The icons are actually a little better, but there are fewer complete ready-to-go sets for specific programs' menu bars. You can, however, make your own.

And then there's Icon-It Pro 3.0 ($129, Olduvai Corporation, 305/670-1112). This fascinating, oddball program leaves the menu *titles* alone, but adds a floating palette of clickable icons representing the *commands*. The effect is much like the tool bar in Microsoft Word and Excel, except that (1) you have infinite control over the size, position, number, function, and look of the icon buttons, and (2) you can add them to any program in the world. Because you can make the icons big enough to write on (labeling one Restart, for example), these icons don't need to be nearly as cryptic as the ones in Word's tool bar. On the other hand, Icon-It is no picnic to figure out, and the floating palette sometimes gets in the way of your windows' title bars, and you don't get any ready-made icon palettes for common programs. On the *other* other hand, big-screen users and those who use a handful of commands frequently will get a kick out of this further advancement of the graphic interface cause.



Menuette If anything can make Microsoft Word's menu bar prettier, it's Menuette (or one of its iconic rivals).

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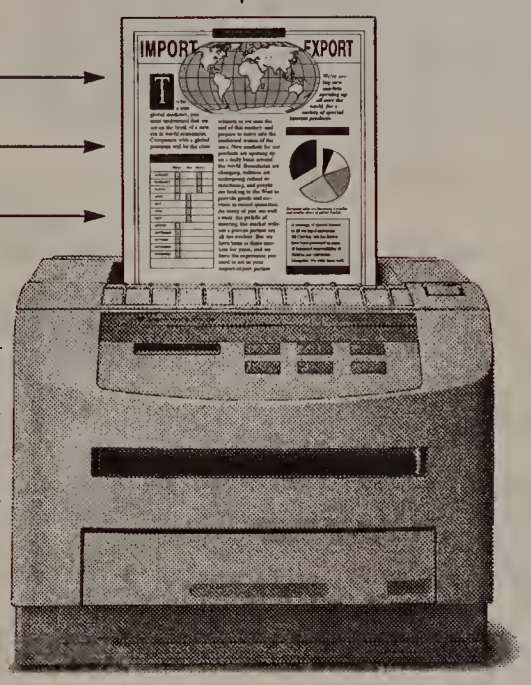
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At first glance, most Macintosh storage solutions all seem the same. So why is it that editors and analysts so frequently select Mirror drives as best of category or Editors' Choice?

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New Products

The Latest Macintosh Releases

EDITED BY CAMERON CROTTY

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY *MACWORLD*. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

32-Bit SIMMs
Got a new Mac LC III, Centris, or Quadra 800? Then the chances are that you need more RAM. These 72-pin SIMMs come in 4MB, 8MB, 16MB, and 32MB configurations. 70ns: 4MB $149; 8MB $360; 16MB true $1625; 16MB composite $745; 32MB $3250. 60ns (for Quadra 800): 4MB $160; 8MB $375; 16MB true $1950; 16MB composite $750; 32MB $3900. Newer Technology, 316/685-4904, 800/678-3726; fax 316/685-9368.

Art Z
This tiny digitizing tablet might be the mouse that roared, or it might replace the mouse on your desktop. With an active area of 6 by 8 inches and a resolution of 1000 lines per inch, this product plugs into the ADB port and features a pressure-sensitive, cordless, batteryless pen. The included driver software allows users to tweak pad settings to individual preferences for screen size, pen sensitivity, and response. $449. Wacom, 206/750-8882, 800/922-6613; fax 206/750-8924.

ColorMax 20T
This 20-inch Trinitron monitor features a .31mm aperture pitch, 1024-by-768-pixel resolution at 75Hz, and meets the Swedish MPR II emissions guidelines. $2499. Sigma Designs, 510/770-0100, 800/845-8086; fax 510/770-2640.



ColorMax 20T

FormsWriter 240 and 290 series
Family of eight dot-matrix printers designed to print multipart forms with up to four copies. All FormsWriters include a two-position (top and bottom) tractor feed and a total of three paper paths. The 240 series emulates the ImageWriter LQ and features a 24-wire print head for letter-quality print at 66 characters per second, according to the company. The 290 series emulates the ImageWriter II and features twin 9-wire print heads for near-letter-quality at 90 cps, and top speeds of 540 cps in fast draft mode, according to the company. All units available with power document-feeder option. 244 $595; 244d $890; 242 $529; 242d $824; 294 $895; 294d $1190; 292 $795; 292d $1090. Advanced Matrix Technology, 805/388-5799, 800/637-7878; fax 805/484-5282.


FormsWriter 240 and 290 series

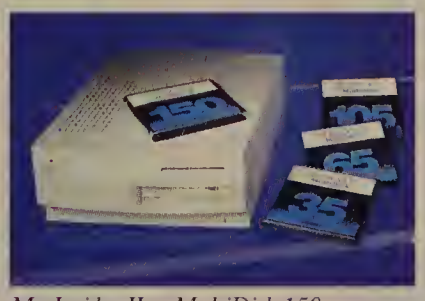
HubWorks-12 NuBus
You can turn any NuBus Mac into a 12-port 10BaseT hub with this hub-board combination. The hub hangs off the back of the machine, drawing electrical power, but no processing time. The product ships with TechWorks HubWatcher network-management software, as well as a BNC connector on the NuBus board for hooking the board to a thin Ethernet backbone. $749. TechWorks, 512/794-8533, 800/688-7466; fax 512/794-8520.

Image Magic
This RISC-based image processor accelerates Photoshop tools, filters, compression/decompression, color conversion, and other processor-intensive activities. The board also speeds up color separation, while offering image controls for unsharp masking, dot gain, and undercolor removal. NuBus version $995; fx or Quadra PDS version $895. Newer Technology, 316/685-4904, 800/678-3726; fax 316/685-9368.

ImagePro
One-size-fits-all acceleration and video for the Mac Classic? The manufacturer claims that its combination accelerator and video board supports any monitor on the market (12 to 24 inches), and provides a 16MHz, 25MHz, 33MHz, 40MHz, or 50MHz 68030 processor to boost the Classic's speed. Users can add up to 16MB of memory, and the board includes a slot for a math coprocessor. 16MHz $649; 25MHz $749; 33MHz $899; 40MHz $949; 50MHz $999. Systech, 904/428-0411; fax 904/428-0765.

Mac DisplayLink CF-530, MF-530
These external video encoders plug into an Apple 8•24, 8•24GC, or compatible board (it also works with Quadra built-in video), and produce NTSC, PAL, or S-Video output. Users can select a 640-by-480- or 512-by-384-pixel image, and can switch between the computer display and other video output using a switch on the front panel of the encoder. The product ships with Macromedia's Action Mac. CF-530 (NTSC/S-Video) $489; MF-530 (PAL/S-Video) $649. Display Tech, 510/676-9362, 800/578-8546; fax 510/676-9335.

MacInsider IIvx MultiDisk 150
An internal Bernoulli drive designed to fit into Macs with a half-height, 5¼-inch removable-storage drive bay (Performa 600, Centris 650, Mac IIvx). The drive reads and writes to 35MB, 65MB, 90MB, 105MB, and 150MB disks; it reads, but cannot write to, the older 44MB Bernoulli disks. The package includes mounting rails, bezel, driver software, and a 150MB disk with shareware. $1099. Iomega Corp., 801/778-1000, 800/777-6179; fax 801/778-3460.



MacInsider IIvx MultiDisk 150

MacVoyager
When you're carrying your office on your back (or in your briefcase), every ounce counts. This data/fax modem fits in a pocket and, weighing in at 6 ounces, certainly qualifies for the featherweight division. The MacVoyager features a 14.4-Kbps (V.32bis, V.42, MNP Class 2 through 4, V.42bis, MNP Class 5) data modem and a 9600-bps, Group III send/receive fax modem. The unit runs off an included AC adapter or an internal 9-volt battery and ships with QuickLink II and STF fax software. $549. Twincom, 919/256-8025, 800/723-2962; fax 919/256-8245.


MacVoyager

MassPak
You haven't had this much fun stacking things since you stopped playing with blocks. This drive-enclosure system can be used as a single unit, or multiple units can be stacked into an interlocking tower. Each drive retains its own power source and external SCSI connectors. Prices vary according to drive mechanisms. Mass Microsystems, 408/522-1200, 800/522-7979; fax 408/733-5499.

MCC-256
This NuBus board offers high-speed data transfer over switched or dedicated 56K digital phone lines, and features V.35/RS-366 communications interface with HDLC message encapsulation and error detection. The product supports AppleTalk and the Communications Toolbox. A Channel Service Unit, which plugs into the board and accesses the digital phone line, is available as an option. $795; $1095 with dedicated 56K Channel Service Unit; $1295 with switched 56K four-wire Channel Service Unit. MultiAccess Computing Corp., 805/964-2332; fax 805/681-7469.

Media Suite Pro
Desktop publishing is dead—long live desktop video. This package combines four (count 'em, four) NuBus boards (NuVista+ video processor, Avid's JPEG compression board, an audio processor, and a SCSI-2 accelerator) with Avid's Media Suite Pro Software. Users can create, edit, view, and record to tape full-screen digital video at 30 frames per second (30 fields per second). $9950. Avid Technology, 508/640-6789, 800/949-2843; fax 508/640-1366.

MultiModem
Heading out into the wild country where there are no rules, this 14.4-Kbps fax modem supports the proposed

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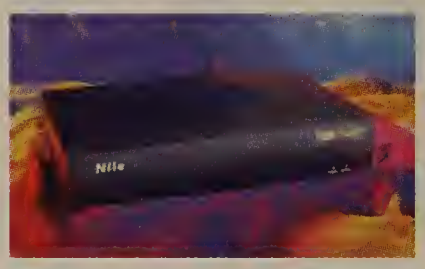
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V.32terbo standard, theoretically pushing data speeds to 19.2 Kbps. The data modem also supports the more common V.32, V.32bis, V.42, V.42bis, and MNP Class 1 through 5 standards. The unit also includes a Group III 14.4-Kbps send-and-receive fax, as well as MultiExpress and MultiExpressFax, MultiTech's proprietary communications packages. $1199. MultiTech Systems, 612/785-3500, 800/328-9717; fax 612/785-9874.



Nile

Nile
You're thinking, "Oh, just another multiprotocol bridge/router," but wait, there's more. This product supports AppleTalk, TCP/IP, IPX, DECnet, and other protocols, and can be configured for thick Ethernet, thin Ethernet, 10BaseT, and several WAN options. 1 Ethernet port, 1 WAN bridge $3750; 1 Ethernet port, 2 WAN bridges $4050; 1 Ethernet port, 1 WAN bridge/router $4750; 1 Ethernet port, 2 WAN bridge/routers $5050. Advanced Computer Communications, 408/864-0643; fax 408/446-5234.

NU-460 and SE-470
Pick your pleasure: thick Ethernet (AUI), thin Ethernet (BNC), or 10BaseT (RJ-45). Both of these Ethernet boards ship with all three types of connectors for compatibility with both older thick wiring and the newer physical standards. The NU-460 plugs into a NuBus slot, while the SE-470 is designed for the Mac IIsi and the SE/30. $229 NU-460 or SE-470. MacNet, 408/954-8888; fax 408/954-8866.

PhotoScript-24
This Raster Image Processor (RIP) plugs into a NuBus slot and interprets PostScript images for your non-PostScript color printer. The board features the 25MHz Weitek RISC coprocessor for faster printing, as well as up to 48MB on-board memory (ships with 16MB). Currently supports Mitsubishi, Shinko, Kodak XL700, Canon, Hitachi, Hewlett-Packard, Mannesmann Tally, Seiko, and Panasonic printers. $2395. Expertec, 313/451-2272; fax 313/451-9515.

RGB/Videolink 1500 series
This line of video scan converters transforms the output from a computer or imaging device to NTSC or PAL composite, RGB (RS-170A or CCIR), or S-Video format for transmission, taping, or projection. The 1500P is set at the factory to a single 15kHz to 90kHz source. The 1500A automatically synchronizes to any 15kHz to 90kHz RGB source; the 1500AX adds an RS-232 control port, graphics-overlay capability, and the ability to output 31.5kHz, to work with display equipment that accepts signals at higher than video rate. 1500P $9495; 1500A $11,995; 1500AX $12,995. RGB Spectrum, 510/814-7000; fax 510/814-7026.

ScanPartner Plus
A hardware and software package that combines a true 300-dpi true-resolution scanner with a single-user version of Blueridge's Optix electronic document-management system. The software enables users to scan, archive, and retrieve documents. The scanner is a flatbed gray-scale unit that comes with an automatic document feeder. The company claims 10-pages-per-minute throughput with up to 11-by-14-inch paper. $2495. Fujitsu Computer Products, 408/432-6333, 800/626-4686; fax 408/894-1706.

SelectPress 600
This 600-dpi (true-resolution) printer offers edge-to-edge printing on page sizes up to 11 inches by 17 inches. The product features automatic switching between parallel, serial, and optional Ethernet ports; a Toshiba engine; a 40MB internal hard drive; 8MB of RAM (expandable to 40MB); and a proprietary PostScript Level 2 interpreter (also supports PCL5). $4499. GCC Technologies, 617/275-5800, 800/422-7777; fax 617/275-1115.



SelectPress 600

TransWarp 4300 Series
This accelerator features a 68030 processor running at 25MHz, 33MHz, or 40MHz (depending on model), a 128K static RAM cache, a math coprocessor socket, and a video/Ethernet expansion connector. Caching can be turned on and off via the included control panel without restarting. Optional support for Apple's virtual memory. 4325 $349; 4333v $449; 4340 $399. Applied Engineering, 214/241-6060, 800/554-6227; fax 214/484-1365.

SOFTWARE

Blacksmith
If you're building applications that run between Macs and mainframes, you can feel like you've got clowns to the left, jokers to the right, and you're stuck in the middle. Blacksmith allows developers to construct GUIs for Macintosh users who need to access data on large central mainframes. On the Mac side, the product supports 4th Dimension, Omnis 7, Prograph, HyperCard, C, and Pascal; and Blacksmith gets you to the mainframe via MacIrma, MacMainframe, Netway, SNA.ps, Novell, NetAxcess, and TokenAxcess. Starter Kit includes Blacksmith Workbench; Blacksmith Workstation, a ten-user pack; three days of consulting time; and the company guar-

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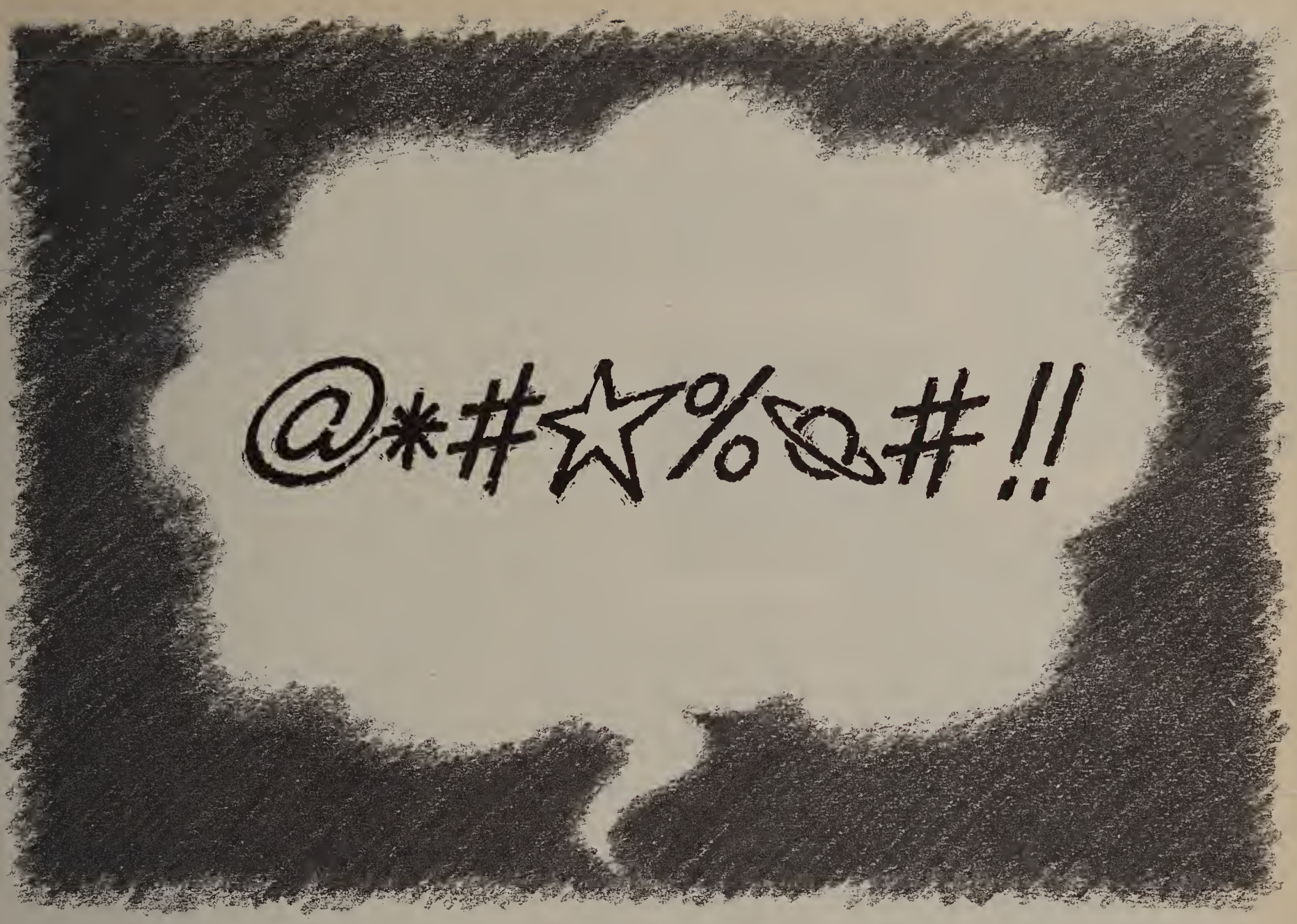
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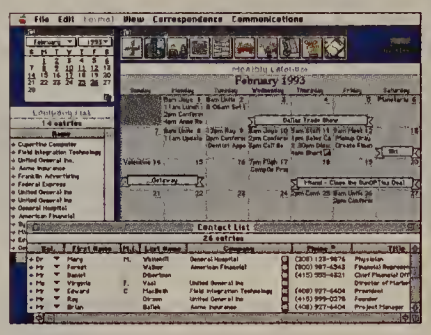
It's tough to think of a peripheral that's slower than a CD-ROM drive, but this driver promises to put the zip back in your chip. CD-ROM ToolKit works in the background, caching frequently used information to the Mac's RAM and hard drive, decreasing file-search times, according to the company. Included control panel allows users to change RAM or hard disk space allocations. $79. FWB, 415/474-8055; fax 415/775-2125.

CLImate

If you left MS-DOS or Unix behind, but you just can't cure the itch for typing commands, this command-line interface for the Mac might be the answer. The product extends the Finder and includes a BASIC interpreter that can be used to write scripts to automate tasks; the command language supports a wild-card mechanism and Unix-style output redirection via piping. 1MB min. memory. $59.95. Orchard Software, 617/876-4608; no fax.

Dark Seed

Just another adventure game, set in just another town, with just another hero—except that this particular hero in this particular town in this particular game happens to be teetering on the brink of an extradimensional biomechanical hell straight out of the works of H. R. Giger (think *Alien*). Players must thread their way through a world where reality fades into futuristic horror with startling suddenness, find out why evil creatures haunt their dreams, and prevent the small town of Woodland Hills from becoming the first conquest of powerful beings from another world. 4MB min. memory. $69.95. Cyberdreams, 818/348-3711; fax 818/348-3772.



Field Assistant

Field Assistant

This relational contact-management tool allows users to track contacts and activities by company or account associations. Unlimited contacts, addresses, phone numbers, activities, notes, and other information can be attached to a specific company or contact. The product features calendars with recurring events, to-do lists, a word processing module, and telecommunications capabilities. 1MB min. memory. $249. FIT Software, 408/927-6404; fax 408/927-6312.

IntelliKeys Overlay Maker

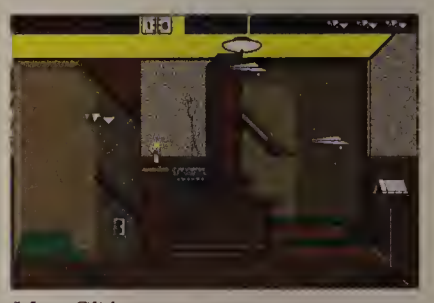
Create custom layouts for the IntelliKeys keyboard. Users draw an overlay on-screen and can include text, colors, and pictures. Keys can be defined to type any combination of keyboard characters or mouse actions, or to change the IntelliKeys settings. The product ships with a library of approximately 200 Picture Communication Symbols from the Mayer-Johnson Company. 1MB min. memory. $69.95. IntelliTools, 510/528-0670; fax 510/528-2225.

MacPhotographer

It's a long way from amateur shutterbug to ace photojournalist, but this program might help you on the way. The product simulates a 35mm single-lens reflex camera, and lets users take simulated electronic photographs. Beginners can experiment with exposure settings, film speeds, and lighting, while the more advanced user can practice metering, bracketing, controlling depth of field, and working with different lenses. Product includes an online encyclopedia of photography, as well as a workbook with 15 lessons that teach specific techniques. 1MB min. memory. $59.95. Eastman Kodak, 716/724-4000, 800/242-2424; fax 716/724-9624.

More Glider

Reams of radical rooms ripe with rewards and packed with peril. There's a new house from the designer of the popular game Glider, as well as six houses built by Glider players with the Room Editor. Requires Glider. $19.95. Casady & Greene, 408/484-9228, 800/359-4920; fax 408/484-9218.



More Glider

Sales Synergy

This package combines a client application with a host-based relational database to automate tasks for sales representatives in the field, as well as to coordinate their efforts and make corporate information more accessible. Information is maintained in a database on the field machine and synchronized with a host server through a network or dial-up connection. The package features customizable rule-based conflict resolution. 4MB min. memory; requires System 7. $995 per user, plus consulting fees. Metropolis Software, 415/322-2001; fax 415/327-5579.

Shade II

Three-dimensional modeling, rendering, and animation package. Product features lathing surfaces, spline curves, ray tracing, point and distant lights, fog, bump mapping, procedural textures, key-frame

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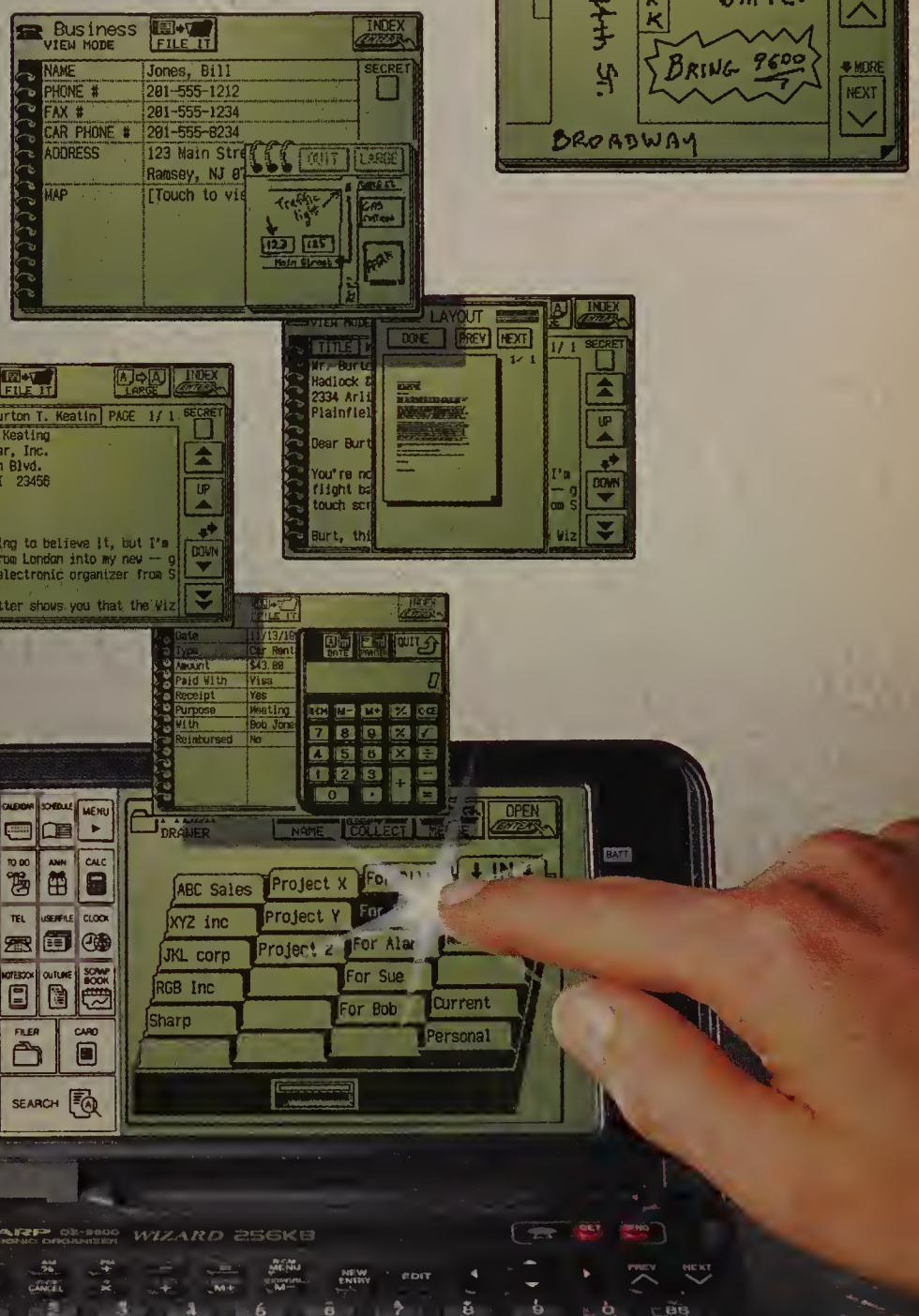
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animation, and spline paths. 4MB min. memory. $2000. SystemSoft America, 415/853-6400; fax 415/853-6406.

SNA.ps 5250 Terminal Emulator

A software package that allows Macs to emulate the IBM 5250 family of terminals. The product supports Token Ring and SDLC attachments to the SNA network, and LocalTalk, Ethernet, and Token Ring connections to AppleTalk networks when running as a client to a SNA.ps Gateway. The emulator supports all IBM 5250 screen display formats, as well as keyboard remapping and keystroke recording. 2.5MB min. memory; requires System 7. $345. Apple Computer, 408/862-3385, 800/795-1000; no fax.

The Sounds of English

This HyperCard product teaches standard American pronunciation by showing the text, graphically illustrating mouth movements, and playing a digitized voice. Users can record, edit, and listen to their own voice, and compare their pronunciation with the program's. The package consists of two modules: Vowels and Consonants. 2MB min. memory. $45 per module. Irvine Interactive, 408/453-5220; fax 619/431-8860.

Star Trek Font Packs

"Beam me up Scotty, we got the dilithium crystals and the new fonts." Drag out all your worn "Star Trek" jokes, because you may want to print them out with some of these PostScript Type 1 fonts from Bitstream's Li'l Bits series. Both the Star Trek Font Pack and the Star Trek: The Next Generation Font Pack feature the familiar credits and titling typefaces, and the individual packs contain typefaces specific to their universe, such as the typeface from the first *Star Trek* movie, the Starfleet vessel code typeface, and the typeface used on all computers, control panels, and equipment inside Jean-Luc Picard's *Enterprise*. $19.95 per pack. Bitstream, 617/497-6222; fax 617/868-4732.

TokenPeek

Flying blind on a Token Ring network is no fun, but this new tool from AG turns your Mac into a Token Ring network analyzer. Users can analyze patterns, statistics, and packet contents on Mac-only or mixed-platform, multiple-protocol networks. The product allows the creation of analysis filters and triggers, and ships with over 13 standard protocol decoders, including SNA, IP, NetWare IPX, Banyan VINES, and the entire AppleTalk stack. Users can also create their own decoders. 2MB min. memory. $995. AG Group, 510/937-7900, 800/466-2447; fax 510/937-2479.

Trumatch ColorPrinter

Application that prints out a Trumatch ColorPrinter Reference Guide on PostScript-compatible printers. Includes profiles for the QMS ColorScript 100 and the Fiery/Canon CLC-55. Other profiles available from Electronics for Imaging (801/977-0200). $98. Trumatch, 212/302-9100, 800/878-9100; fax 212/302-0890.

Under Cover

Serious and humorous fax cover sheets. Over 100 different sheets, covering a range of situations. $49. WordStar International, 415/382-8000, 800/523-3520; fax 415/883-1629.

U-Page

This software allows users to send messages to a paging terminal via modem or other serial device. U-Page Pro has user directories, custom user groups, log-to-disk capability, and repeated sending of canned messages. 1MB min. memory. U-Page $49.95; U-Page Pro $129.95. Desktop Paging Software, 716/634-9010; fax 716/634-9003.

WaterMark

You can finally turn that multithousand-dollar heap of computer equipment into something useful: an answering machine. This voice-mail software works with Apple's Communications Toolbox, Sound Manager, and any modem using Rockwell International's RC96V24 and RCV144ACL voice-capable chip sets. Callers can leave recorded messages and, using a touch-tone phone, enter a return telephone number. Messages are compressed to the hard drive, and users can recover them while sitting in front of the Mac, or remotely via touch-tone telephone. 2MB min. memory; requires System 7. $170. High Tide, 510/704-9927; fax 510/704-9933.

CD-ROMS

Clinton: Portrait of Victory

For digital fear and loathing on the campaign trail, check out this disc of over 300 photographs taken by *Time* magazine photojournalist P. F. Bentley. The product includes recordings of speeches, QuickTime video clips of the campaign, theme music, and narration by Roger Rosenblatt and Michael Kramer, chief political correspondent for *Time*. $39.99. Warner New Media, 818/955-9999, 800/593-6334; fax 818/955-6499.

Lunicus

From the cushioning, black shadow of Mare Imbrium you come, flashing toward Earth for a last, desperate battle against the Hive Queen and her mechanized brood. In this action adventure game, you fight your way, building by building, through the cities of Earth; secure the Lunicus Moonbase; and then confront the Hive Queen on the mother ship. $99.95. Educorp, 619/536-9999; 800/843-9497; fax 619/536-2345.



Lunicus

Multiple Media Tour

Does this title remind you of a Beatles tune? This disc sports hundreds of resources: sounds, backgrounds, textures, animations, QuickTime movies, clip art, buttons, and more. Also, includes SuperCard browsing/clipping interface in six languages. All resources are royalty-free. $379. Audio Visual Group, 617/381-1609, 800/676-7284; fax 617/381-1609.

ProGraphix

These two image libraries feature over 300 computer-generated 3-D images per disc (in varying resolutions), as well as PICS and Director animations. Images include vectors, grids, outer space, computers, music, globes, and others. $295 per volume. East West Distribution, 213/848-8436; fax 213/848-3034.

Sampler Discs

Kodak Photo CDs of digitized photographs by professional photographers, including Cliff Hollenbeck, Wolfgang Kaehler, Kevin Morris, and Christopher Roberts. All images come from Digital Zone's catalog of more than 1.3 million images. Digital Zone can develop customized Photo CDs based on a customer's categories or convert existing images to Photo CD. $599. Digital Zone, 206/623-3456, 800/538-3113; fax 206/454-3922.

ACCESSORIES

3D Z Mouse

This input device has more bells and whistles than your fingers will know what to do with. The mouse has a roller ball underneath (for traditional mouse movements), three buttons and a trackball on top, plus a thumbwheel on the side. The trackball rests on three rolling wheels instead of the usual two, allowing users to twist as well as roll the trackball. The device ships with an ADB driver. $250. Multipoint Technology, 508/692-0689; fax 508/692-2653.



Colani Mouse

Colani Mouse

The makers of this sculpted, one-button mouse claim that it's perfectly adapted to human physiology. The product comes in a right-handed version only and is large enough so that users can actually rest their entire hand on the mouse instead of controlling it with their fingers. $79. Moustrak, 702/884-1925, 800/221-6687; fax 702/884-1827.

DynaMouse

This two-button mouse-without-a-tail uses infrared signals to communicate your desires to the Mac. The device runs on a rechargeable battery, and executes programmable macro functions when the user presses the right-hand button in combination with a key on the Mac keyboard. The product comes with two batteries. One charges in the base while the other is in use. $99.95. DynaPoint, 818/854-6440; fax 818/854-6444.

BOOKS

Dover Electronic Clip Art Library

Book ships with four disks of over 400 EPS clip-art images from the Dover Pictoral Archive Library on topics ranging from business to health to dining. The book is divided into two parts: Studio tells how to acquire and use clip art, and Gallery is a hard-copy reference to the images on the disks. Written by James Nadler. 272 pages. $49.95. Bantam Electronic Publishing, 212/492-9479, 800/223-6834; fax 212/492-8941.



Dover Electronic Clip Art Library

PowerBook: The Digital Nomad's Guide

If you just can't wait to get on the road again, you might want to haul this power book along with your PowerBook. Authors Andrew Gore and Mitch Ratcliffe cover topics from choosing hardware and software to power management to cyberspace. The book ships with the Roadside Assistance Kit, a disk of seven demos, freeware apps, and full-featured utilities. 348 pages. $24. Random House, 212/751-2600, 800/733-3000; no fax.

The Smiley Dictionary

Amaze your friends, communicate clearly with other online Smiley people, and finally be sure whether you should thank someone or take a swing at them for the :P comment they just made. Compiled by Seth Godin. 86 pages. $6.95. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991.

Voodoo Mac

Hear the drums in the distance? The natives are restless tonight, señor. In this book, author Kay Yarborough Nelson shakes her bones and herbs at the Mac, conjuring up an array of tips, tricks, and traps for users desiring a psychic perception of their Mac. 307 pages. $21.95. Ventana Press, 919/942-0220, 800/743-5369; fax 919/942-1140. m

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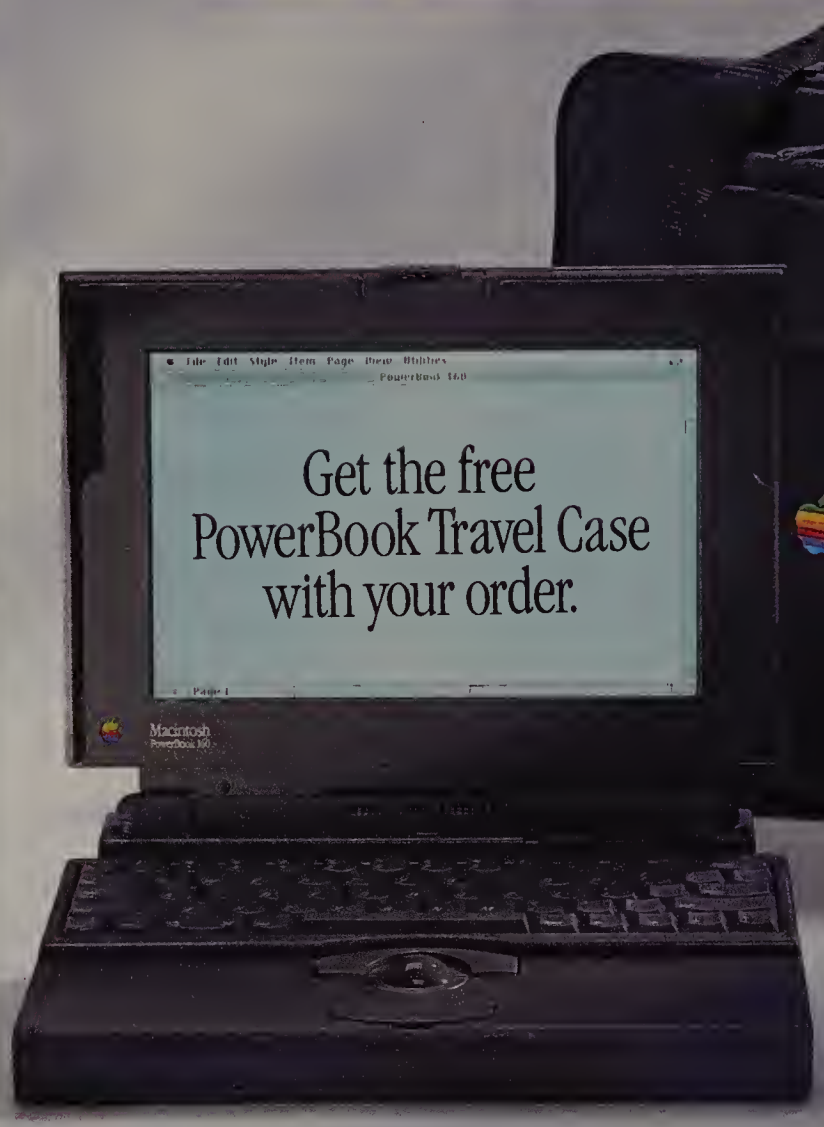
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Questions and Tips from Macworld Readers

BY LON POOLE

ALTHOUGH THE MAC IISI WAS designed to hold only one expansion board, it is possible to plug in two boards with a dual-slot adapter (I stated otherwise in April's *Quick Tips*). For example, you could connect SuperMac's VideoSpigot videodigitizer and DayStar's Universal PowerCache accelerator board to SuperMac's dual-slot PDS (Processor Direct Slot) adapter, and plug the combination into the IIsi's expansion slot.

But if you use two expansion boards, make sure both boards together do not draw more electrical power than the IIsi can supply. Apple recommends a maximum of 7 watts for PDS boards or 13.3w for NuBus boards. If excessive power draw overheats a IIsi, it shuts itself down and you cannot restart it until it cools off.

Trouble Interrupting

PRESSING ⌘–POWER ON INTERRUPTS A Mac IIsi, LC, LC II, or Classic II (as described in April's *Quick Tips*) only if debugger software such as Apple's MacsBug is installed. Dave Martin correctly reported via Internet that the ROMs in those models do not contain the debugger software that in other Mac models brings up a dialog box with a prompt character in the shape of a greater-than symbol (>) and responds to commands you type such as **G FINDER**. Pressing ⌘-option–power on does restart a IIsi, LC, LC II, or Classic II (as stated in April).

StyleWriter Background Printing

SYSTEM 6 USERS, YOU CAN INDEED PRINT in the background on a StyleWriter using standard Apple software. You must install the StyleWriter driver software version 7.2.2 or later, which is available at low cost on the System 7 Tune-Up 1.1.1 disk from Apple dealers, online information services, and user groups (as detailed in last December's *Quick Tips*). You must also upgrade to Chooser 3.6, Backgrounder 1.3, PrintMonitor 7.0, and MultiFinder 7.0. All those versions are on the System 6.0.8 installation disks, and are available at low cost from the sources just named.

Other Charge-Call Methods

THE STRING OF NUMBERS A MODEM must dial to access an alternate long-distance phone company and charge a call to a phone credit card usually exceeds the length limit that most modems impose on dialing strings. February's *Quick Tips* presented two methods for entering long dialing strings such as:

1 800 877 8000,, 0 703 555 1212,, 123 456 7890 1234

But neither method works with custom communications programs such as America Online 1.0 and 2.0 nor with communications programs that use the Apple Communications Toolbox such as AppleTalk Remote Access 1.0, QuickMail Remote 2.5, and ClarisWorks 1.0.

Shortening the dialing string by two characters may be enough to make it work in those programs. With most modems you can do this by using a **W** in place of each set of commas, as follows:

1 800 877 8000 W 0 703 555 1212 W 123 456 7890 1234

If the **W** doesn't work for you, make one comma do the work of two, as Scott Cole of Carlisle, Massachusetts, does, by sending the modem the following standard AT command before sending the dialing command:

AT S8=4

This command sets the pause time for each comma to 4 seconds instead of the factory-standard 2 seconds, eliminating the need for double commas. For a longer pause, put any number of seconds up to 255 after the equal sign in the command above. Your communications program can send the **S8=4** command automatically when it sets up the modem before dialing a number if you can modify the program's modem initialization string or modem command string (see "Custom Configuration").

To further shorten the dialing string and keep your credit card number secret, Christophe Marcant of San Francisco says omit everything after the remote modem's phone number, like this:

1 800 877 8000 W 0 703 555 1212

After your modem successfully dials these numbers, you hear the long-distance company's tone cuing you to enter your credit card number. At that time pick up a phone connected to the same phone line as your modem, dial the credit card number manually, and hang up the phone.

You don't have to dial the credit card number manually if you have one of the many modems that can store a number in its own memory and can dial the stored number on command. To store the credit card number, you send a command to the modem using a general-purpose communications program such as FreeTerm (available for the cost of distribution from online services and from many user groups including BCS Mac, 617/625-7080). For example, the following command stores a 14-digit number in the internal memory of Apple's original internal modem for the PowerBook 140 and 170:

AT&Z=123-456-7890-1234

A similar command stores the number in the first of four memory locations of a Global Village or Supra modem:

AT&Z0=123-456-7890-1234

The number remains until you store another number, even if you turn off the modem. Now you can specify the credit card number by appending one or two characters to the dialing string. For Apple's internal PowerBook modem, append an **S** as follows:

1 800 877 8000 W 0 703 555 1212 S

For Global Village or Supra modems, append **S0**:

1 800 877 8000 W 0 703 555 1212 S0

You can also dial a modem call manually—for example, to make an operator-assisted call—even with a communications program that doesn't offer manual dialing as an option. You must connect

continues



Organizing font files, charging modem calls, reversing transposed letters, and more

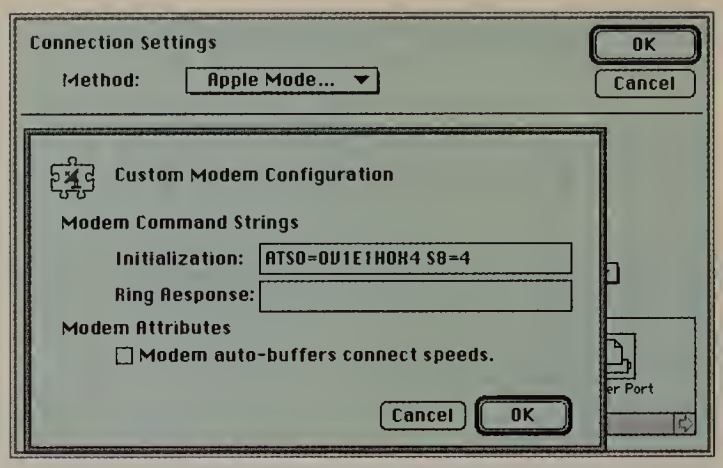
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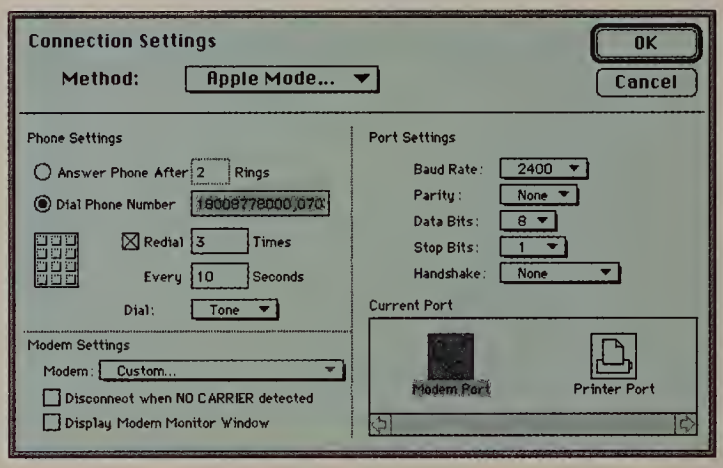
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Custom Configuration When charging a modem call to a phone card, add **S8=4** to the modem initialization string (top) to increase a comma's pause time from 2 to 4 seconds, eliminating the need for double commas in the dialing string and shortening it just enough to work in the many communications programs that use Apple's Communications Toolbox software (bottom).

your telephone to the same phone line as your modem. Instead of entering a phone number in the space provided in your communications program, Brian Burton of Austin, Texas, suggests entering only a comma. Place the call using the telephone (with operator assistance if needed), and click the Connect button when you hear the phone ringing, before the remote modem answers. The comma causes the modem to wait two seconds and then pick up the phone line. To have the modem pick up immediately when you click Connect, substitute a **P** for the comma.

Font Confusion

Q. I just installed System 7.1 and now find myself with several seemingly duplicate, yet not identical, font files in the Fonts folder inside my System Folder. For example, I have three versions of Helvetica bold (see "Font Profusion"). What is it with all these Helveticas anyway? Which one is the TrueType version? Which is used when I specify 12-point Helvetica Bold?

Thomas R. Schultz
Chicago, Illinois

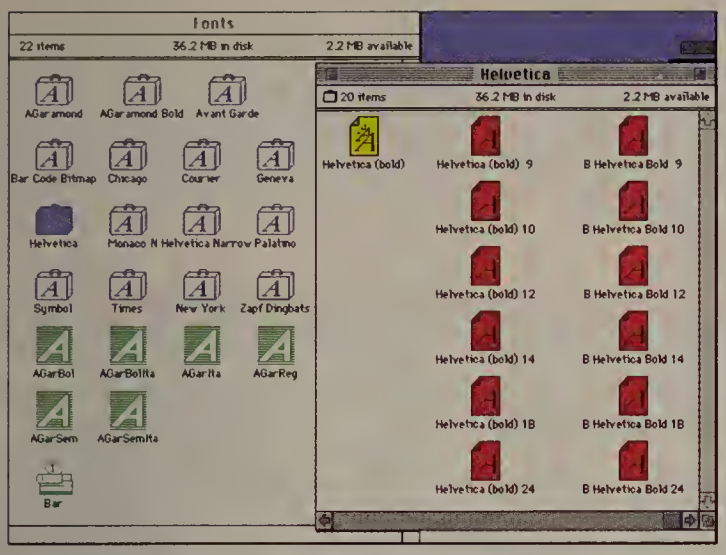
A. Each of your fonts is a specific type—bitmapped, TrueType, or PostScript—and a particular style, such as plain, bold, or italic. Furthermore, each bitmapped font is a fixed size, such as 12 points. (Each TrueType and PostScript font can be scaled to any size.) You can identify a bitmapped font by the single *A* on its icon. Icons of TrueType fonts have three *A*'s, each a different size to represent TrueType's variable-sizing capability. A PostScript font's icon may look like a generic laser printer, or it may have custom graphics designed by the font maker. The icon name identifies the font style and—for a bitmapped font—the size.

Your Font menus don't list every individual font because the Macintosh system software coordinates the different types, styles, and sizes into font families according to information the font maker includes in each font file. Apple groups all the multiple styles and sizes of its bitmapped and TrueType fonts into individual font families. For example, the Helvetica family includes Helvetica, Helvetica (bold), Helvetica 12, Helvetica (bold) 12, and many other individual font files. In contrast, Adobe provides a separate family for each style of its bitmapped fonts, such as Helvetica and B Helvetica Bold. All those separate families clutter up your Font menus unless you install the Adobe Type Reunion software, which organizes related font families into Font submenus. Alternatively, you can combine related font families into one family using utility software such as Font/DA Utility, which comes with ALSoft's MasterJuggler.

The particular font that the system software displays or prints depends on the type of output device. System 7 (and System 6 with the TrueType extension) can use any type of font—bitmapped, TrueType, or PostScript—on any kind of output device including screen display, PostScript printer, and QuickDraw (non-PostScript) printer.

For screen display, the system software first tries to find a bitmapped font in the exact size needed. If it can't find that, it looks for a TrueType version of the font that it can scale to the needed size. Lacking that, it tries to have Adobe Type Manager (ATM) software, if installed, scale a PostScript font to the needed size. If no other font is available, the system software scales the best-available fixed-size font.

For printing on a PostScript printer, the system software looks first for a PostScript font from the printer's ROM,



Font Profusion This System 7.1 Fonts folder contains font suitcases (blue) and PostScript fonts (green). The Helvetica font suitcase contains one TrueType font (yellow) and bitmapped fonts (red). With the three versions of Helvetica bold in the Helvetica suitcase, bold-style 12-point Helvetica text would be displayed using the bitmapped font Helvetica (bold) 12. A PostScript printer would use the Helvetica bold from its ROM, and other printers would use the TrueType font Helvetica (bold) scaled to 12 points. The bitmapped font B Helvetica Bold 12 would be used only if you chose B Helvetica Bold from the Font menu instead of choosing Helvetica and applying bold style.

RAM, or hard drive (if any). If the printer doesn't have the PostScript font, the system software tries to download (copy) it from the Fonts folder, Extensions folder, or System Folder. Failing that, the system software tries to use a TrueType font, and as a last resort a fixed-size font. On other printers, the system software tries to find first a TrueType font, next a PostScript font (if ATM is installed on your Mac), and then a fixed-size font.

With System 7.1, your Fonts folder can become very cluttered. You can reduce the clutter by dragging bitmapped and TrueType fonts into font suitcases. A font suitcase works like a special folder just for bitmapped and TrueType fonts, and its icon looks like a suitcase with an *A* on it. A Fonts folder can contain up to 128 items—fonts, suitcases, or a combination. Each suitcase in the Fonts folder can contain any number of fonts up to a maximum size of 16MB.

Getting Off the Desktop

TIP The Finder's Put Away command can eject a disk and remove its icon from the desktop, as Apple's Macintosh manuals fully explain. But you may not realize that the same command can return other desktop items to their previous locations. For example, you might move a document to the desktop to make it easier to find while you work on it for several days. When you're done with it, just select its icon and use the Put Away command to put it back in the folder from which you previously removed it.

Ludo Devaux
Deurne, Antwerp, Belgium

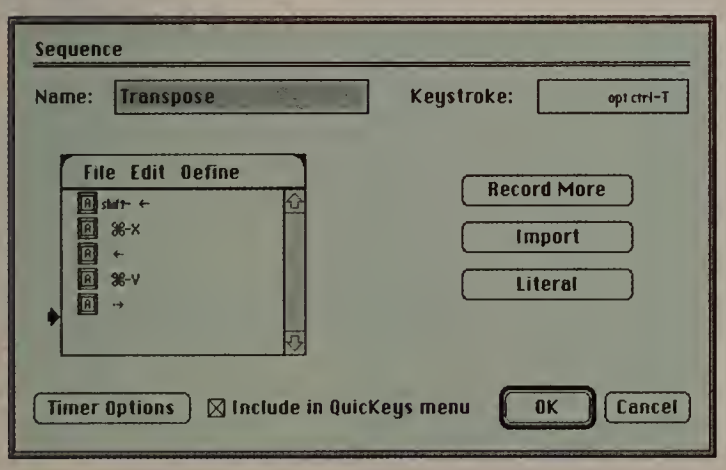
Transposing Typos

TIP One of my most frequent typing errors is the transposition of characters—for example, typing *teh* instead of *the*. You can create a QuicKeys macro that fixes transposed pairs of letters in applications that allow you to select text by holding down the shift key while pressing an arrow key.

To create the macro, first create a document in a word processor that permits selecting text with the shift and arrow keys (such as ClarisWorks, Symantec GreatWorks, MacWrite II, Microsoft Word, WordPerfect, or WriteNow). Type any two letters and then begin recording a new QuicKeys sequence (for example, by choosing Record Sequence from the QuicKeys submenu of the Apple menu). Now press the following keystrokes: shift–left arrow, ⌘-X, left arrow, ⌘-V, and right arrow (right arrow returns the insertion point to its initial location after the transposed pair). Stop recording and QuicKeys displays its Sequence dialog box (see "Transpose Characters"). Assign the sequence a name like Transpose and a keystroke like option-control-T. Click OK to dismiss the dialog box.

While the QuicKeys window is still open, copy your

continues



Transpose Characters This QuicKeys² macro sequence transposes the two characters before the insertion point in any application that permits selecting text with the shift key and the left arrow key. The sequence uses the Cut command, replacing the previous contents of the Clipboard. A similar sequence uses the Move Text command in Microsoft Word to leave the Clipboard undisturbed (see text).

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Prometheus 30 day MBG
10934...ProModem 144i, 14.4 fax/data.....259

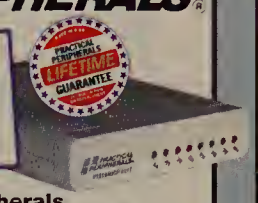
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11245...SupraFax Modem V.32bis for PB .279

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10334...14.4 PowerTwin internal.....299
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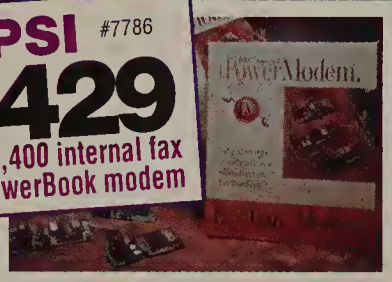
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11247..SupraFax Modem Plus 24/96 V.42bis..142

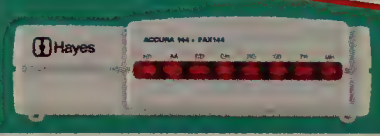
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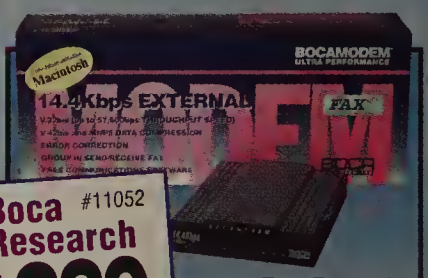


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Hayes
11419...Accura 144 fax - V.42, V.42bis.....259
11422...Accura 96 fax - V.42, V.42bis.....229
10822...Accura 24 w/ Smartcom.....69

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1777.....Quicktel M9696XV Platinum.....289

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2004.....NetModem/Ethernet (10Base-T).1475

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10337...14.4 Voyager 14.4/96 S/R 362

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3455.....Microphone Pro.....209
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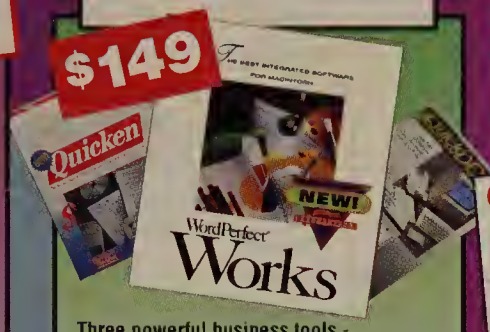
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11492...(1) 4 MB RAM 72-pin 60ns.....169
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11494...(1) 16 MB RAM Composite 72-pin 60ns 759

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10341...4 MB RAM Duo 210/230 205
10340...8 MB RAM Duo 210/230 369
9424.....4 MB RAM PB 160/180 219
9426.....6 MB RAM PB 160/180 319
9427.....8 MB RAM PB 160/180 429
9446.....10 MB RAM PB 160/180 499
5090.....4 MB RAM PB 140/145/170 189
5091.....6 MB RAM PB 140/145/170 25
11653...4 MB RAM PB 165c 219
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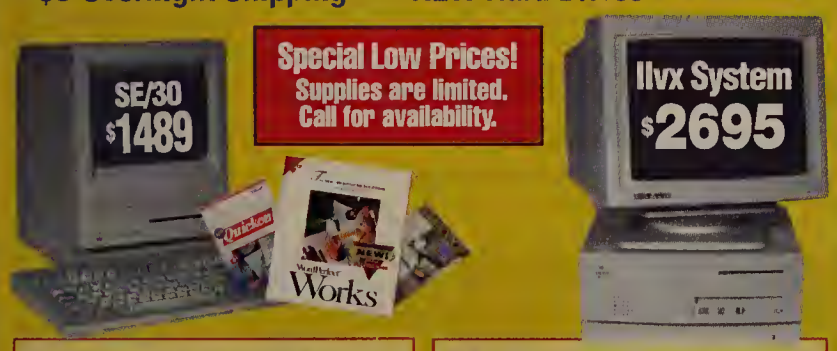
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recorded sequence and paste it into the keysets of other applications where you want to use it or into the universal keyset. (To paste into the keyset of an application that's not open, choose Open from the File menu inside the QuicKeys window.) Finally, click OK to dismiss QuicKeys.

To operate the macro, move the insertion point just after two transposed characters and activate the sequence (for example, by pressing the keystroke you assigned when you recorded the sequence). Use this macro with caution. It wipes out whatever you last stored on the Clipboard with the Cut or Copy command.

Anthony Reimer
Brooks, Alberta, Canada

In Microsoft Word you can avoid using the Clipboard by recording the following keystrokes instead of the ones specified above: shift–left arrow, ⌘-option-X, left arrow, left arrow, enter, right arrow. This sequence of keystrokes uses Word's Move Text command instead of the Cut and Paste commands. If you use Word 4 and have trouble with the ⌘-option-X command, substitute shift-F2. You need an extended keyboard to record this version of the macro, but after recording it you can use it on a Macintosh without an extended keyboard. To copy a macro to another Mac, save a copy of the keyset containing the macro to floppy disk (use the QuicKeys Save A Copy command), switch the floppy to the target Mac, open the keyset, and copy and paste the macro to any keyset on the target Macintosh.—L.P.

Simple Desktop Clock

TIP I opened my standard Alarm Clock desk accessory and positioned it just above my hard drive icon where it is unobtrusive yet always visible (unless I drag a window over it). Then I put an alias of the Alarm Clock in my Startup Items folder. Now I always have a clock on my desktop, and I didn't need additional software for it.

Jim Lockridge
Burlington, Vermont

User groups and online information services have lots of alternative clocks, some free and some low-cost, but none simpler. You can also use the Alarm Clock to stamp a document with the current time and date. Here's how: click the clock to bring it to the front, choose Copy from the Edit menu, click the document you want to stamp, and choose Paste from the Edit menu.—L.P.

Quark Custom-Color Copy

TIP You can quickly transfer a custom color from one QuarkXPress document to another. With both documents open, select the item tool and drag an item having the desired color from the source document to the destination document. If you delete the copied item from the destination document, its custom color definition remains.

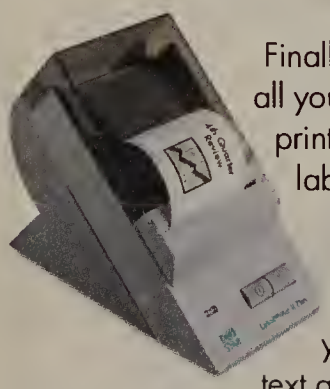
Mike Rohde
Milwaukee, Wisconsin

You can use a similar trick to copy style sheets. Simply drag a text block containing text with the desired style sheet to another document, then delete the copied text block, and its style sheet remains. Instead of dragging an item to copy its custom color or style sheet, you can copy and paste it with the usual Edit menu commands.—L.P. **m**

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Guide to System 7.1* (IDG Books Worldwide, 1992).

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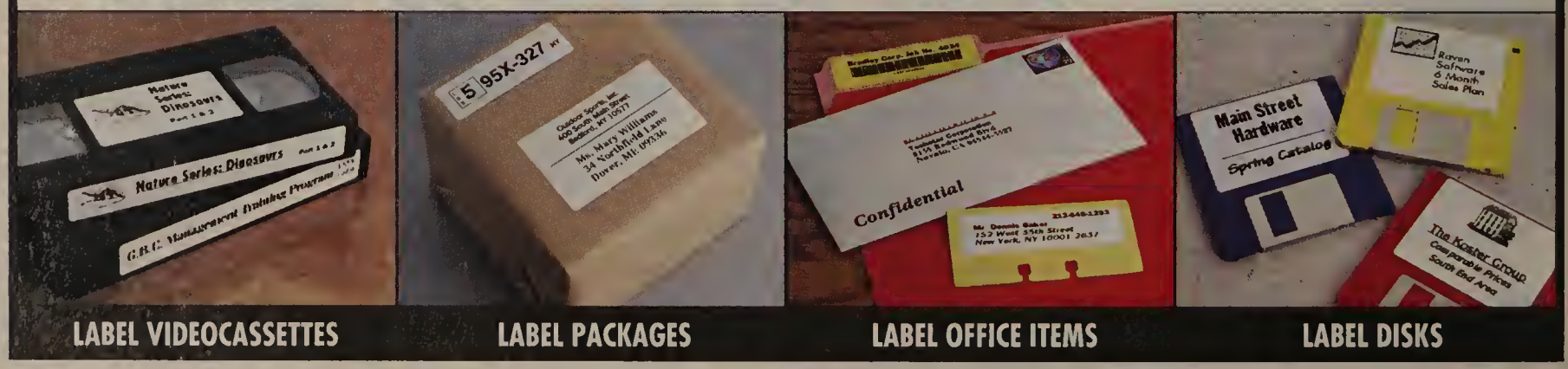
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PostScript Printing Techniques

BY JIM HEID

IF YOU USE A LASER PRINTER IN AN office, chances are it's a PostScript printer. Some non-PostScript laser printers are available for the Mac—examples include GCC Technologies' PLP series and Apple's Personal LaserWriter LS and LaserWriter Select 300—but PostScript printers' superiority for graphics and publishing work and their ability to be easily shared on a network have made them the preferred printers in the Macintosh business world. Since Apple's original LaserWriter appeared in 1985, I've worked with more than 100 PostScript printers in the course of writing *Macworld*'s printer roundups (the last one on lasers, "Workgroup Printers," appeared in January 1993). This month, I present a collection of tips and techniques for improving performance, managing fonts, and upgrading your PostScript printer. The following tips also apply to color PostScript printers.

No Start-Up Page

LET'S START WITH AN EASY ONE. WHEN you switch on a PostScript printer, it ruminates for a minute and then prints a *start-up page* listing information about the printer: the number of pages it has printed, the fonts it contains, the settings of its various ports. Rarely are these statistics useful; mostly, the start-up page just wastes time, toner, and paper.

The low-tech solution is to simply pull out the paper tray an inch or two when you switch on the printer. When the online indicator illuminates, indicating the machine is warmed up and ready for print jobs, slide the tray into place.

A better method is to explicitly tell the printer to stop printing its start-up page. Most of today's PostScript printers sport calculator-like keypads you can use to adjust various settings—including whether to print a start-up page.

If your printer doesn't have a keypad (none of Apple's do), you need to run a utility program on your Mac to disable the start-up page. Apple's PostScript printers include a utility called LaserWriter Utility; if you have a non-Apple PostScript printer, you may be able to obtain a copy from an Apple dealer. An older, less-capable program called LaserWriter Font Utility is on the System 7.1 Tidbits disk and is also widely available through online services and user groups. Both programs have a Utilities menu containing a command called Start Page that lets you enable or disable the start-up page.

Name That Printer

WHEN YOU USE THE CHOOSER TO SElect a PostScript printer, the printer's name appears in the Chooser's device list. Usually, the name corresponds to the printer's model number—LaserWriter Pro 630, for example. With the LaserWriter Utility's Printer Name command, you can change the name to something more descriptive—Art Department Printer or 5th Floor LaserWriter—or just more fun—Trixie's Printer or Li'l Gutenberg. Naming a printer is especially valuable if your network contains two or more printers of the same model, a situation that makes it impossible to tell which printer in the Chooser is which.

If you can't round up LaserWriter Utility, check the disks that came with your printer. An older Apple utility called The Namer also lets you change a printer's name.

Font-Downloading Strategies

YOU PROBABLY KNOW THAT YOU CAN supplement the fonts built into a PostScript printer with downloadable fonts that reside on the Mac's hard drive and are transferred to the printer's memory. When you print a document, the Mac's PostScript printer driver—the system file named LaserWriter—asks the printer if it contains the required fonts. If it doesn't, the driver automatically downloads the fonts, clearing them from the printer's memory at the end of the job.

Automatic downloading is convenient, but there's a catch. One downloadable font takes up to 20 seconds to transfer over a LocalTalk network. If you use a few downloadable fonts, you add a minute to the time required to print a document. And if you print a document a few times in the course of fine-tuning its formatting, the wasted time piles up even more.

One answer is manual downloading. By taking the time to download by hand the fonts you plan to use, you remove the need for automatic downloading during print jobs. Fonts downloaded manually remain in the printer's memory until you nix the power or reset the printer.

You can download fonts using LaserWriter Utility or its older sibling (see "Downloading Fonts Manually"). A more-convenient option is a $20 shareware control panel called Startup Downloader, by Manuel Veloso. With Startup Downloader, you specify sets of fonts that you want to manually download. Startup Downloader then creates a tiny (20K) application program that, when run, downloads the fonts. If you use System 7 and you put these miniprograms in your hard drive's Startup Items folder, the Mac downloads the fonts when you start up. If you use System 6, select the miniprograms and use the Finder's Set Startup command. Either way, it's manual downloading made automatic.

Regardless of how you download, it helps to know where your downloadable font files are located. System 7.0 stores downloadable PostScript fonts in the Extensions folder; in System 7.1, they live in the Fonts folder. Both folders are located within the System Folder. In system versions prior to 7.0, PostScript fonts reside within the top level of the System Folder.

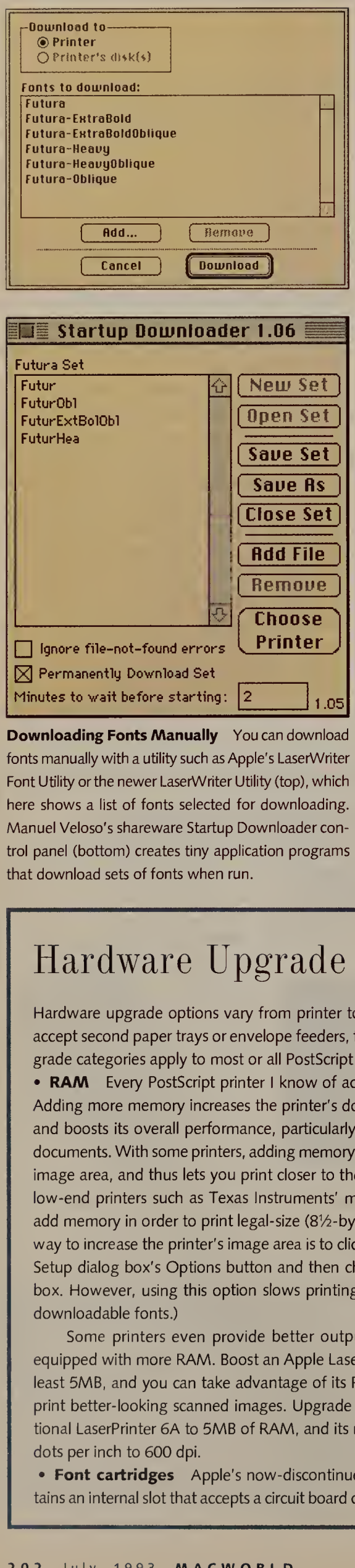


From speed to print quality, getting the most from a PostScript printer

There are some drawbacks to manual downloading. Each font you manually download leaves less room in the printer's memory for fonts that might be automatically downloaded during print jobs. At worst, you might receive an error message during a print job stating that the document couldn't be printed. In this case, you need to reset the printer to clear its memory—you can't selectively remove fonts that you've manually downloaded.

One possible solution to this printer-memory problem is buried within the Page

continues



Downloading Fonts Manually You can download fonts manually with a utility such as Apple's LaserWriter Font Utility or the newer LaserWriter Utility (top), which here shows a list of fonts selected for downloading. Manuel Veloso's shareware Startup Downloader control panel (bottom) creates tiny application programs that download sets of fonts when run.

Setup dialog box: click on the Options button and then check the box named Unlimited Downloadable Fonts in a Document. When this box is checked, the LaserWriter driver purges automatically downloaded fonts as soon as they're used. However, if a given font is needed again, it must be downloaded again, lengthening print times. For this reason, a better solution is to strike a balance between manual and automatic downloading: manually download only those fonts you use most and let the LaserWriter driver download the bit players for you.

The best alternative to the downloading dilemma is to attach a hard drive to the printer's SCSI port—if it has one. Some SCSI-equipped printers include Apple's LaserWriter IINTX, IIf, and IIg, and LaserWriter Pro 630; GCC's BLP II and BLP IIS; Texas Instruments' microLaser Turbo series; and NEC's Silentwriter2 990. Most color PostScript printers also have SCSI ports.

When you attach a hard drive to a printer, you can use a font-downloading utility to download fonts to the drive. Then, when the fonts are required during a print job, the printer transfers them from its hard drive to its memory—almost instantly. A hard drive also makes a PostScript printer faster at printing documents containing a large variety of fonts, sizes, or styles. One more plus: you can delete the printer font files from your Mac's hard drive, thereby reclaiming some precious storage space. (Be sure to make backups, though, before trashing the font files.)

If your printer lacks a SCSI port, you can still boost its capacity for downloadable fonts by adding a memory upgrade or font board to the printer (see "Hardware Upgrade Options").

Sharing Fonts on a Network

DOWNLOADABLE FONT FILES USE roughly 50K of disk space apiece. Twelve downloadable font files—that's only three font families, assuming four fonts per family—can easily eat up half a megabyte of disk space. If you have a large downloadable font library and multiple Macs on a network, you're probably wasting a lot of disk space by storing the same font files on each Mac's hard drive.

Attaching a hard drive to the printer is one solution to this problem. A less-expensive answer is to combine a font-management utility—either Fifth Generation Systems' Suitcase (504/291-7221) or ALSoft's MasterJuggler (713/353-4090)—with System 7's built-in file-sharing features or with a file-server program such as Apple's AppleShare.

First, determine which Mac will be the font server, and then copy to its hard drive all your printer fonts and at least one suitcase file. (A suitcase file holds *screen fonts*—those bitmap versions of the outline fonts PostScript printers rely on. You can create suitcase files using Apple's Font/DA Mover utility, a System 7–compatible copy of which is included with Suitcase. If you don't have Font/DA Mover, copy one of the suitcase files on the System 7 Fonts disk to your hard drive, and then open the

Hardware Upgrade Options

Hardware upgrade options vary from printer to printer—some machines accept second paper trays or envelope feeders, for example. But some upgrade categories apply to most or all PostScript printers.

• **RAM** Every PostScript printer I know of accepts a memory upgrade. Adding more memory increases the printer's downloadable-font capacity and boosts its overall performance, particularly with graphically complex documents. With some printers, adding memory also increases the printer's image area, and thus lets you print closer to the edges of the page. With low-end printers such as Texas Instruments' microLaser PS17, you must add memory in order to print legal-size (8½-by-14-inch) pages. (Another way to increase the printer's image area is to click on the LaserWriter Page Setup dialog box's Options button and then check the Larger Print Area box. However, using this option slows printing and leaves less room for downloadable fonts.)

Some printers even provide better output quality when they are equipped with more RAM. Boost an Apple LaserWriter IIf's memory to at least 5MB, and you can take advantage of its PhotoGrade technology to print better-looking scanned images. Upgrade an IBM/Lexmark International LaserPrinter 6A to 5MB of RAM, and its resolution jumps from 300 dots per inch to 600 dpi.

• **Font cartridges** Apple's now-discontinued LaserWriter IINTX contains an internal slot that accepts a circuit board containing additional fonts. Other PostScript printers—including numerous models from QMS, Texas Instruments, Okidata, and Lexmark—provide front-panel slots that hold font cartridges. Fonts in a font cartridge don't have to be downloaded; in addition to boosting the printer's performance, font cartridges free more of the printer's RAM for lesser-used downloadable fonts and reduce data traffic on the network.

The best source for font cartridges is Sonnet Technologies (714/261-2800, 800/945-3668), whose FontCards sell for between $199 and $249 and contain between 10 and 18 Adobe typefaces. Sonnet will also create customized cartridges containing the fonts you use most, including any custom fonts you may have created using programs such as Altsys's Fontographer.

• **Controller upgrades** Xante Corporation (205/476-8189) sells numerous hardware upgrades for Apple's original LaserWriter, for the LaserWriter II series, and for other popular printers from Hewlett-Packard, Canon, QMS, and others. Xante's Accel-a-Writer series boosts resolution to 600 dpi and provides faster performance as well as SCSI ports for hard drives. Xante's upgrades (along with the firm's laser printers) also sport an innovative feature called Virtual Disk Technology that enables you to permanently download fonts to the printer. The ImageUp board from NewGen Systems (714/641-8600) provides similar benefits (sans the Virtual Disk Technology) for HP LaserJet series II printers.

suitcase's icon and remove the fonts inside. Then, copy the screen fonts into this empty suitcase.) If you move the freshly packed suitcase to a certain folder, be sure to store the printer fonts in the same folder—that's what enables Suitcase to find them (see "Font Server Setup").

If you want to store a large number of screen fonts on the server, consider combining them into logically packed suitcase files. You might pack suitcases according to project—all the fonts for the company newsletter, for the training manual, and so on—or you might simply pack them by family—all Futura fonts in one suitcase, all Garamond fonts in another, and so forth. Warning: Although it's OK to rename a suitcase file, you should never rename a printer font file. If you do, the LaserWriter driver will be unable to automatically download that font.

After you've copied all the screen and printer fonts to the font server, you can delete them from the other Macs' hard drives. Finally, make the font server's hard drive available to the other Macs on your network by using System 7's Sharing Setup control panel or by running the AppleShare application. (See last January's *Getting Started* for more details on setting up System 7's file sharing.)

Now, install a copy of Suitcase or MasterJuggler on each Mac. (Legally, you must buy a copy for each machine.) Use each Mac's Chooser to connect to the shared hard drive, and then open Suitcase or MasterJuggler and use its Open command to open the desired font suitcases on the shared hard drive. (You need open only one suitcase file for the Mac to be able to find all the printer font files.) Chances are you'll want multiple users to be able to open a given suitcase. If so, in Suitcase, check the Shared box before opening a given font suitcase. If you use MasterJuggler, you need to configure the server's access priviliges so that the folder containing the fonts does not allow users to make changes—see page 81 in the ALSoft Power Utilities manual for details.

Setting up a font server requires an initial investment in time (and probably troubleshooting), but the rewards are there. Besides saving disk space on each user's machine, storing all fonts in one place makes managing your font library easier. And both Suitcase and MasterJuggler have numerous features that streamline working with fonts, desk accessories, sounds, and other system resources.

Printing Font Samples

IF YOU HAVE A LARGE FONT LIBRARY, you might want to assemble a font catalog: printouts showing your fonts in various point-sizes and styles. Typesetting houses often provide type-specimen books to their clients to aid them in choosing fonts. In my previous life as a typesetter, I spent hundreds of hours typesetting these font fashion shows.

With Jim Lewis's theTypeBook, a free utility available through user groups and online services, creating font catalogs is as easy as choosing a few commands. theTypeBook can print font samples in six different formats, including charts showing which key sequences summon special characters. For $45, Jim Lewis (714/542-5518) will create a customized version of theTypeBook that prints a company name and logo on each page.

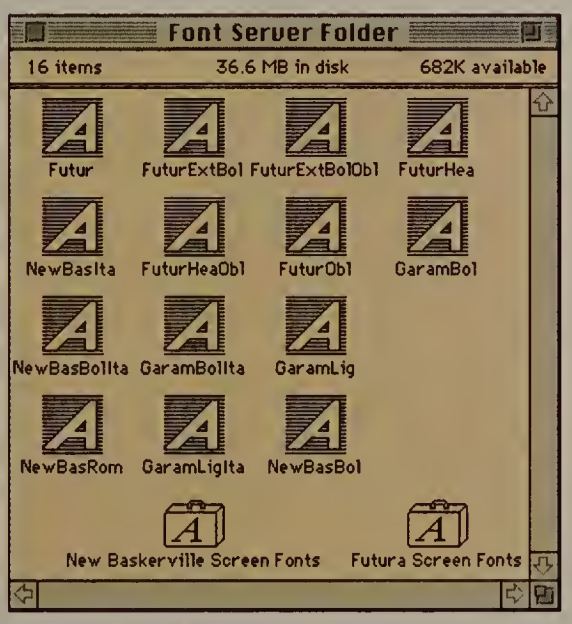
Improve Your Driving

OVER THE YEARS, APPLE HAS RELEASED numerous updates to the LaserWriter driver—the link between a Mac and a PostScript printer. At this writing, the latest version is 7.2. (The version number appears in the upper-right corner of the Print dialog box.)

By the time you read this, however, a significant new version of the driver, the result of a collaboration between Apple and Adobe Systems, should be available. If you buy an Apple printer, you'll receive a driver called LaserWriter 8.0. If you buy a non-Apple printer, you'll receive a driver named PSPrinter. Whatever its name, its primary benefits are the same: it's faster and provides direct access to whatever specialized paper-handling features your printer provides. For instance, if you have a printer with two paper trays (or even one paper tray and a manual-feed slot), you can specify that the first page of a document be printed from one tray and that subsequent pages be printed from the other—great for business correspondence that uses letterhead and second sheets.

The new driver also provides better support for the enhanced printing capabilities of PostScript Level 2, the version of PostScript built into most of today's monochrome laser printers and into a growing number of color machines. The new driver can also print up to four reduced-size pages on a single sheet of paper—handy for proofing purposes.

You'll also be able to buy the PSPrinter driver in an Adobe-labeled package. At this writing, its price had not been finalized, but it's expected to be under $25. It promises to be the cheapest way to improve a printer's performance.



Font Server Setup To set up a font server with Suitcase or MasterJuggler, put the printer font files in a shared folder with one or more suitcase files. (Adobe printer fonts are shown here; other firms' printer fonts have different icons.) Then, connect to the shared folder and open one or more of its suitcase files.

Some Quick Printer Tips

I COULD RAMBLE ON ABOUT POSTSCRIPT printers until I ran out of toner, but I'm almost out of room. In closing, I'll leave you with some tips for improving a PostScript printer's overall performance.

- Manually download frequently used fonts. I've spent much of this column on this tip, but it's worth repeating. There is no better way to inexpensively improve performance with downloadable fonts.
- Don't use fonts with city names, such as New York or Geneva. They're cheesy TrueType versions of the Mac's original bitmap fonts. Besides looking inferior to true PostScript fonts, these fonts require the printer to perform additional calculations that slow performance.
- Don't use TrueType fonts on a non-Apple printer. For reasons I described in the article "Personal Printers" (*Macworld*, September 1992), TrueType fonts print slowly on most non-Apple printers, especially printers that use RISC processors.
- Use the Print dialog box's Black & White option. If you're proofing a page with color or gray-scale images, you'll see it sooner by choosing the Black & White option. (In the new Apple/Adobe driver, click on the Print dialog's Options button and then choose Black and White from the Print pop-up menu.)
- Uncheck the Larger Print Area or Unlimited Downloadable Fonts options unless you really need them. They commandeer printer memory that would otherwise be used to handle the calculations required to print a page.

Finally, don't forget the best way to boost a PostScript printer's performance: avoid mixing a slew of fonts, sizes, and styles on a page. You'll not only see your pages faster, but the pages you see will look better. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest book is the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.


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A CLEAR VIEW OF TOMORROW

The Conference Program

As your computer capabilities grow stronger, more powerful, and more sophisticated, your Macintosh is rising to the occasion. But you need to know more. You need to get an overview of what Mac technology can do today, and you need to know how you can slash costs, increase productivity, maximize your efforts, and even have fun in the process. You also need to know what the future will be for Macintosh computing. What's new and exciting in Macintosh technology? What's in store for tomorrow? What new directions is Apple taking and how will you be affected?

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7. The Science/Technology Conference. Stellar applications of the Macintosh in laboratory and scientific settings, plus user feedback and industry updates on the Mac's role as a significant computing platform.

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12.□ K-12 Education
13.□ Legal Services
14.□ Manufacturer (computer industry)
15.□ Manufacturer (non-computer)
16.□ Other (specify)

Your title

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18.□ DP/MIS Manager
19.□ Manager/Department Head
20.□ Network Manager
21.□ Programmer/Analyst
22.□ Engineer/R & D
23.□ Consultant
24.□ Marketing/Sales
25.□ Educator
26.□ Art Director/Graphics
27.□ Editor/Writer
28.□ R & D
29.□ Student
30.□ Other (specify)

Size of your organization (number of employees national and international)

31.□ Under 50
32.□ 50–99
33.□ 100–499
34.□ 500–999
35.□ 1,000–5,000
36.□ Over 5,000

Which personal computer(s) do you own/use?

37.□ Macintosh (128K, 512K(E))
38.□ Macintosh Plus
39.□ Macintosh Classic/Classic II
40.□ Macintosh LC
41.□ Macintosh SE/SE 30
42.□ Macintosh II/IIx
43.□ Macintosh II si
44.□ Macintosh II cx/ci
45.□ Macintosh II fx
46.□ Macintosh Quadra Series
47.□ Macintosh Portable/ PowerBook Series
48.□ Apple II Series
49.□ IBM PC (or compatible)
50.□ None
51.□ Other (specify)

52. Which hotel are you staying at?

_____

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August 6:	10 a.m. - 3 p.m.	August 6:	10:30 a.m. - 2:30 p.m.

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Published hotel rates are starting rates

All hotel phone numbers are in the 617 area code. Rooms are priced for single and double occupancy.

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236-2000; $155/$170

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Marriott Long Wharf
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Westin Copley (C)
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Omni Parker House (B)
227-8600; $145/$165

Back Bay Hilton (C)
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Holiday Inn Randolph (H) (Randolph)
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Copley Plaza (C)
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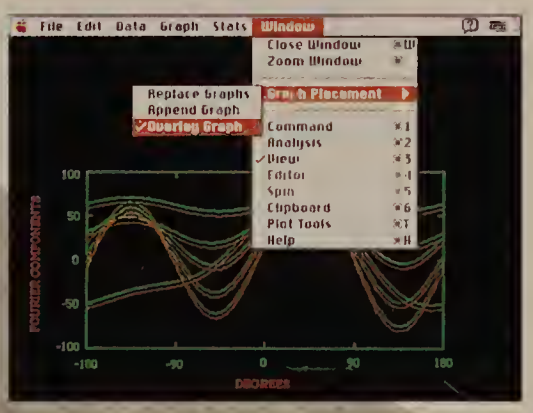
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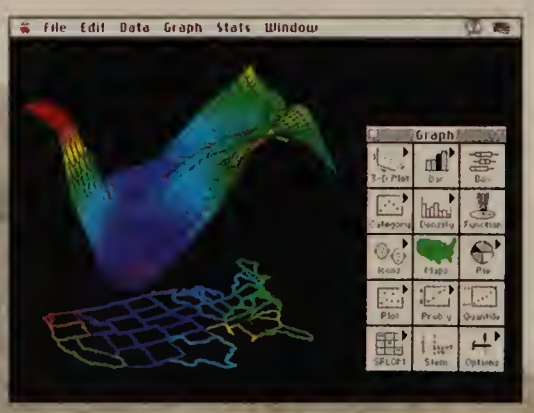
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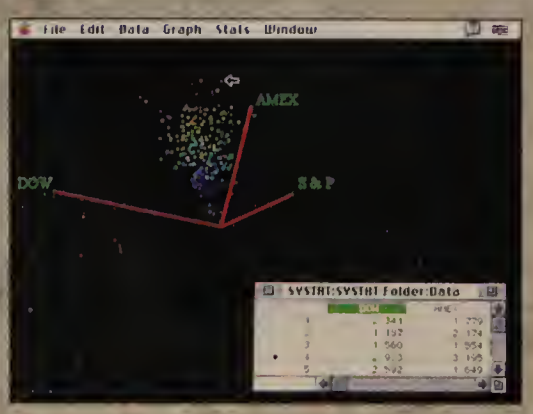
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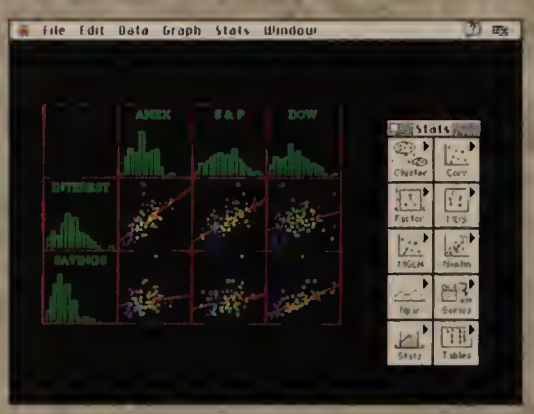
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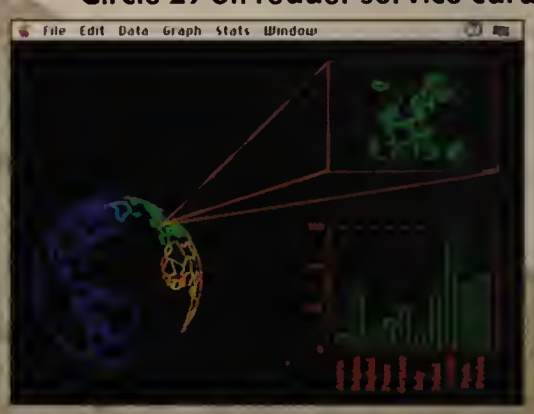












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BY CARY LU

PowerBook Notes

Presentations on the Road

YOU'VE UNDOUBTEDLY FOUND THAT the PowerBook is a great way to carry your ideas around with you. But those ideas won't do you much good unless you can communicate them. So how can you best bring your ideas to life? By creating and giving a presentation.

In its simplest form, a presentation turns a computer display into a slide show or a movie screen. An elaborate presentation can turn into a multimedia extravaganza, which a PowerBook is quite capable of orchestrating.

First you need some software to create a presentation. The two leading presentation programs, Aldus Persuasion and Microsoft PowerPoint, are more alike than they are different. Both take up about 1.5MB of hard drive space for a minimum installation and 1.5MB of RAM to operate. Both support QuickTime movies. Both come with player programs that can play back (but not create or edit) a slide show; you can freely distribute the player programs, which come in both Mac and Microsoft Windows versions for cross-platform file sharing. Users who do a lot of presentations tend to prefer Persuasion, although the latest release of PowerPoint, 3.0, has narrowed the gap. For more elaborate presentations that incorporate sound and animation, I'd choose Macromedia Action.

Depending on the kind of information you deal with, you may not need a bona fide presentation program. If your needs lean toward text, Symantec's More can do the job. For graphs and business charts, consider DeltaPoint's DeltaGraph Professional. For drawings, try Deneba's Canvas, Claris's MacDraw Pro, or Aldus IntelliDraw. These graphing and drawing programs do not always include the decorative touches of presentation programs—fancy transition effects between slides or stylish font rendering—but they all include a slide-show feature and work quite well on any PowerBook; you can edit your presentations right up to the minute you go on stage. All of these programs are suitable for use by anyone with a clear idea of what should go in the presentation.



PHOTOGRAPH BY PAUL FRANZ-MOORE/SCREEN IMAGE BY JIM LUDTKE

Two much more ambitious programs are more often used by specialists than by typical computer users. If your presentation depends heavily on music, Passport Producer (Passport Designs, 415/726-0290) offers a wide range of MIDI features along with fairly complete presentation features. For the most elaborate presentations, Macromedia Director (Macromedia, 415/252-2000) offers comprehensive control over animation, movies, and graphics. If you use a professionally prepared presentation, the results are usually polished but canned. You probably won't do much last-minute tweaking to these presentations. If your presentation would benefit from a high degree of interactivity, you may be better off with a simpler presentation that you can prepare and revise yourself.

Using the PowerBook Display

BEFORE YOU START PREPARING A PRESENTATION, you have to decide what kind of display to use. A simple presentation can work fine with black-and-white images, but many presentations benefit from being in gray scale, or better yet, color. None of the PowerBooks can display photo-realistic images in either grays or color. The PowerBook 140, 145, and 170 are limited to 1-bit black-and-white displays. The PowerBook 160, 180, and Duos can show just 16 grays (4-bit images), and the built-in video on current PowerBooks only goes up to 8-bit color (256 colors). The best and cheapest way to get better images is to install PaperClip Products' GraVu control panel (see "A Dithered View").

A PowerBook screen works adequately if your audience is limited to a single person—maybe two if they are really friendly. Use AC power rather than battery power for a little brighter backlight. The active matrix screen in the 170 and 180 works much better for presentations than do the washed-out LCDs of the other PowerBooks, but not even active matrix can compete with a bright CRT display, especially a color CRT.

Getting Video Out

THE POWERBOOK 160, 165C, AND 180 ALL have video ports, as does a Duo with a dock. If your model lacks a video port, and you plan to do a lot of presentations, consider replacing your PowerBook.

Nevertheless, there are ways to get video out of a PowerBook that lacks a video port. All PowerBooks have a SCSI port, and several companies make video

continues

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Dolphin photos courtesy Marineland of Florida.

interfaces that connect to that port. The $599 PowerView from Radius (408/434-1010) and the $699 SuperView from SuperMac (408/245-2202, 800/334-3005) both weigh less than 2.5 pounds and supply 8-bit color to large monitors; Radius up to 16-inch size and SuperMac 19/20-inch size. The PowerView supports 19/20-inch monitors in monochrome, and the SuperView includes NTSC and PAL video output; neither works with the PowerBook 100. The ScuzzyView from Aura Systems (619/438-7730, 800/365-2872) does work with the 100.

All SCSI video interfaces share a common problem—slow speed compared with standard Mac video. QuickTime movies are impossible. Sluggishness isn't always a problem during a slide-show–style presentation, since you will probably do some talking during transitions between slides. But it can be irritating while you're preparing the presentation or if you want a responsive, interactive screen. If you must use a SCSI video interface intensively, run it in 1-bit black-and-white mode; switch to color only when you have to. To avoid SCSI speed problems, you can add a video-output circuit to a PowerBook 140, 145, or 170 instead. There are three products to choose from; each adds no more than 2 ounces to a PowerBook.

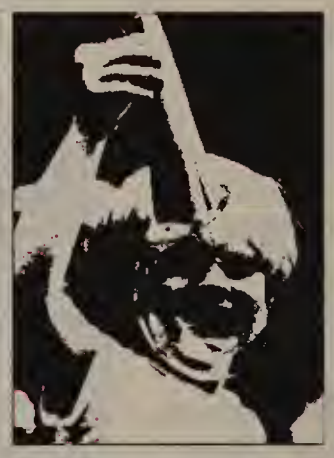
- The simplest such circuit just mirrors the PowerBook screen: the $399 model PB-10 Video Adapter from PowerR (206/547-8000, 800/729-6970). Its small ribbon-cable assembly attaches internally to the PowerBook's LCD connector, comes out through the crack between the top and bottom halves of the PowerBook case, and ends in a tiny connector. The connector plugs into an 8-ounce box that contains circuitry for driving a VGA display only. Since these PowerBooks support only 1-bit black and white, you should add GraVu to the mix.
- The PowerVision from Mirror Technologies (612/633-4450, 800/643-0625) supports several monitors, providing 8-bit color on 13- or 14-inch Mac and VGA monitors, and 4-bit gray-scale images on SuperVGA and one-page portrait monitors. The PowerVision installs at the memory connector, and you can plug in Apple's 2MB RAM board on top of it. Prices are $199 with no RAM, $329 with 2MB, and $449 with 4MB. The video-output connector installs at the left-side cap of the PowerBook's screen hinge. The same product is sold by Envisio (612/339-1008) as the NoteBook Display Adapter 030 (Mirror owns Envisio).
- Computer Care (612/371-0061, 800/950-2273) makes the most elaborate internal video board, the BookView Imperial; it comes with 6MB of RAM. The video comes out a small plug

continues

A Dithered View

For all but the simplest presentations, a PowerBook—and most Macs limited to 16 grays or 256 colors or less—can benefit from GraVu, a $25 control panel from PaperClip Products (918/749-7417, 800/497-5508), which dithers gray scale and color to create significantly improved images. GraVu does require Color QuickDraw, so it does not work with a PowerBook 100 or any 68000-based Mac.

For GraVu to work, the images must have sufficient gray-scale or color information: 256 grays or 16-bit color (thousands of colors). GraVu works fine with 24-bit color (millions of colors), but 16-bit and 24-bit images look the same.


1-bit image without GraVu


1-bit image with GraVu


256 colors without GraVu


256 colors with GraVu

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APS Companion Drives

The editors of MacWorld chose the APS Companion drive the best external drive product for your PowerBook because of its portable, battery-powered design and esthetic styling. An economical alternative to other external PowerBook drive products, this is the only one that can operate on a single charge for over four hours. Available in 80MB, 120MB, 160MB, and 213MB configurations.

Model	Battery/AC powered	AC-Only
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APS SCSI Boy



You just can't exist in a desktop world without having to hook up to peripherals on your desktop. It's such a hassle to carry two or three cables with your PowerBook just so you have the right one when you need it. Now one simple, innovative device ends the confusion. It has a 30-pin PowerBook SCSI connector in one end and a 25- pin connector at the other end. $29.



MW Editors' Choice



Konnexx Kit

The Konnex Kit is a must for PowerBook or PC laptop users who travel a lot, telecommunicating with their computers. It has all the tools, connectors and adapters necessary to make almost any telephone system work with a modem, including a 9600 baud acoustic coupler. $149.

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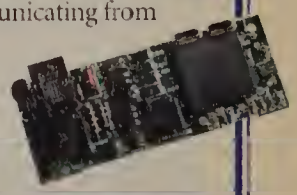
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installed at the right-side hinge cap; a cable adapter ends in a standard Mac video plug. The BookView supports 8-bit color on all Apple monitors up to 16 inches and 1024 by 768 pixels on a 19-inch screen. Its street price is about $800. The company plans a BookView Imperial 16 that will support 16-bit color on the same screens and should sell for about $1100 plus a $99 NTSC video converter.

Aside from the BookView Imperial 16, none of the video solutions supports more than 8-bit, or 256 colors, so scanned color images often have banding that resembles a solarized picture. GraVu will smooth over the most garish artifacts.

Showing Off

ONCE YOU'VE GOTTEN A VIDEO SIGNAL out of your PowerBook, what can you do with it? The nicest, most compact portable monitor is the ColorFrame, a 10.5-inch-diagonal active matrix flat-panel display from Envisio. The $4995 price is steep, but the ColorFrame weighs 5 pounds and takes up only 270 cubic inches, compared with a typical 13- or 14-inch CRT monitor's 25 or more pounds and over 2300 cubic inches (over 5000 cubic inches boxed). The ColorFrame can display 4096 colors; Envisio supplies a control panel to simplify 16- and 24-bit color to 4096.

You can, obviously, connect to a CRT monitor. A Mac monitor poses no problems, but if you use a compatible multisync monitor, you're better off connecting in a Macintosh video mode than in VGA or SuperVGA mode, because most of the video interfaces described here produce flicker-prone images in VGA (60Hz refresh) and SuperVGA (56Hz refresh). A few PowerBook video products, such as the Radius PowerView, can drive a VGA/SuperVGA at the newer, flicker-free 72Hz refresh rate.

To connect a PowerBook to a VGA or a multisync monitor, you must convert the Mac's 15-pins-in-2-rows plug to the VGA's 15-pins-in-3-rows plug. James Engineering (510/525-7350) sells such a plug adapter, the MacVGA ($25), included in Apple's PowerBook DOS Companion kit. The standard James adapter, as well as most of those offered by monitor makers, only supports a 640-by-480-pixel screen, regardless of the monitor's capabilities, although James does sell an 824-by-632-pixel-screen adapter. Of the monitor companies, only Nanao 310/325-5202, 800/800-5202) offers a cable adapter with a switch supporting multiple Mac modes on its multisync monitors—but the adapter costs $80.

Projection Panels

YOU CAN ALSO CONNECT A POWERBOOK to an LCD projection panel that works in conjunction with an overhead projector. Here the refresh-rate differences between Mac and VGA modes aren't important, since the input buffer and display technology in LCD panels suppress any flicker. Many panels come with cables for both an IBM PC and a Mac. Panels that don't accept Mac video do accept VGA input—with one possible hitch. Apple's VGA output puts both horizontal and vertical sync signals on a single pin, compatible with most but not all VGA display devices. Some LCD panels, particularly early designs still being produced by Sharp, need separated sync signals. To connect to such panels, use the PowerR Universal 3202 LCD video adapter ($199, 7 ounces).

Projection-panel prices span a wide range. The few monochrome units begin at about $1100 (street price). Passive matrix color LCDs start at about $2500; the much-better-looking active matrix models begin at about $3200. Prices

continues



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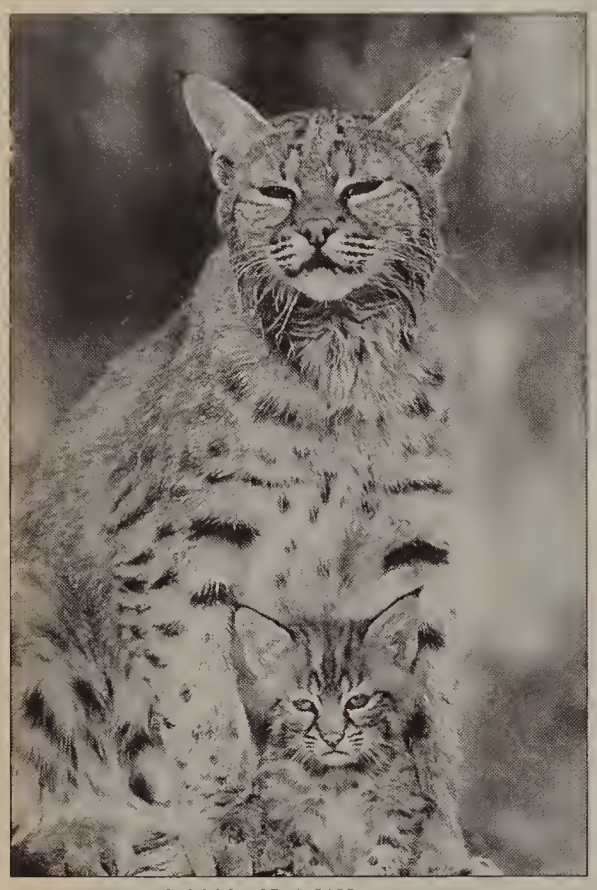
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depend in part on how many colors a panel supposedly can display. But LCD panels don't have a very good tonal range, so a panel claiming 180,000 colors doesn't look much different from one claiming 16,000 colors or even 4000 colors.

For portable presentations, one LCD projection panel stands out—the $5995 (list price) PanelBook from In Focus Systems (503/692-4968, 800/327-7231), an active matrix color panel. The PanelBook's electronics mount in a drawer that slides into the panel's innards when not in use. It's the only projection panel small enough to fit in a briefcase. It weighs 6 pounds with an AC adapter. All projection panels require AC power, which you need for the overhead projector anyway.

(Overhead projectors are so widely available that you usually don't need to bring your own. If you do, you'll find that the smallest projector, from 3M, weighs 14 pounds. When folded up, it's approximately the size of an attaché case.)

Very few LCD projection panels display more than 640 by 480 pixels. The $8995 In Focus 7600WS passive matrix color panel shows 1024 by 768; among PowerBook video interfaces, only the BookView Imperial and the SuperView drive the 7600WS fully. An 832-by-624-pixel image will be centered in the display, leaving a border on all sides.

Having all these different pixel counts raises the issue of screen size. In the computer world 640 by 480 is standard, but a PowerBook's internal screen shows only 640 by 400. If you view a 640 by 480 image, the PowerBook will cut off the bottom 80 pixels. If you send out a 640 by 400 image through a video interface, the display will have 40-pixel-high black bands at the top and bottom. The safest strategy is to prepare presentations in 640-by-400-pixel size so you can see the entire image on a PowerBook. If you want to output 640 by 480 pixels, design the images so the bottom 80 pixels don't contain anything important.

If you adopt a higher-pixel-count screen, chances are that your PowerBook will simply be the carrier for the data; you will certainly want to prepare the presentation on a larger screen. However, you won't be able to preview or edit the presentation on a PowerBook screen. For steady work on a PowerBook, stick to 640 by 400. (Apple plans to use 640 by 480 in future PowerBooks.)

Getting on the Boob Tube

FINALLY, A VIDEO CONVERTER CAN transform a 640-by-400-pixel or a 640-by-480-pixel image into a standard NTSC television signal for a big-screen television or a closed-circuit television system. A wide range of converters are available with prices beginning under $200, but the cheapest units produce smudged, flickery images, while the medium-price units produce mediocre, flickery images. Single horizontal lines—plentiful on the Mac desktop—create the most flicker, since television images send odd-numbered and even-numbered lines alternately. The quickest way to get rid of single horizontal lines on the desktop is to use ClickChange, a $90 utility from Dubl-Click Software (818/700-9525, 800/359-9079) that lets you alter the appearance of a Mac's desktop. In ClickChange, choose the window and button style titled No Flicka (NTSC), choose the scroll bar style called Nexxed, and install the font Chicago NTSC. Or you can avoid the desktop altogether and produce a full-screen presentation; scanned images and QuickTime movies generally look acceptable on a television, even with a poor video converter.

The best video converters have circuitry that eliminates flicker and produces clean, stable images with quite legible 14-point text in all fonts and even 12-point text in some fonts—as long as you have a decent television set. Such quality comes at a steep price; the excellent RGB/Videolink 1500AX converter from RGB Spectrum (510/814-7000) goes for $12,995 and weighs 25 pounds.

Hearing Things

FOR PRESENTATIONS INCLUDING SOUND, the speaker built into a PowerBook won't project very far. If your presentation room has a sound system, you can connect to it with an audio cable; the PowerBook accepts a standard stereo minijack. (The Duos do not have an audio-output jack except through a suitable dock.) The audio output of a PowerBook—or any other Mac—lacks the power to drive external speakers. You'll need speakers with a built-in amplifier (powered speakers), preferably with a volume control and an on/off switch, since making adjustments with the Sound control panel is awkward. Many inexpensive powered speakers don't work well; the Koss SA/30 speakers, widely sold for $20, represent the smallest decent powered speakers, good enough for the typical hotel room. They weigh in at 2 pounds with an AC adapter. For a large conference room try the Radio Shack Minimus-0.7 powered speakers ($59.95, and just over 4 pounds with AC adapter). The Koss and Radio

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In the May issue of Macworld magazine, Mirror's PixelView Full-page Display was singled out as Editors' Choice. We'd like to thank Macworld for this acknowledgement of our hard work.

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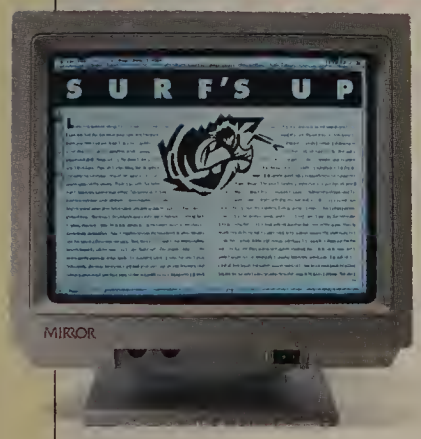
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Circle 122 on reader service card

Shack speakers also operate on batteries.

Although all the PowerBooks are capable of stereo sound, a single mono speaker—half the size and weight of a stereo pair—is usually all you need for presentations; use a plug adapter to combine the two channels (Radio Shack #274-378 to a phono plug, #274-374 to a mono minijack). But most powered stereo speakers cannot be used singly. Test before buying, since some units can't produce a full spectrum of sound.

Remote Control

USUALLY FOR A CANNED PRESENTATION you need only advance the image (change the slide). The most common arrangement assigns forward and reverse controls to the left and right arrow keys. If you stay close to the PowerBook, such control is easy; in a darkened room, you might want to put tape or some other tactile cue on or in front of the arrow keys. But if you don't want to be tethered to the computer, you can use a remote-control device.

The $99 ProPresenter is the simplest infrared remote-control system for a Mac. Sold by Presentation Electronics (916/652-9281, 800/576-9281), the credit card–size remote has only two buttons, forward and reverse; an infrared receiver about the size of the mouse plugs into and draws power from the ADB port on the PowerBook. The complete system weighs 3.5 ounces.

For more interactive control, the $169 ProPresenter+ from Presentation Electronics is larger—about the size of a TV remote control; it uses the same infrared receiver as the ProPresenter. This remote has 25 buttons, including 8 cursor-direction buttons and a numeric keypad. All the buttons are programmable; the complete system weighs 6 ounces.

For complete mouselike control, the $595 AirMouse from AirMouse Remote Controls (802/655-9600) detects—at a distance of up to 32 feet—the pitch and yaw (up/down, left/right rotation) of the hand-held controller. You can literally wave at the screen to move the cursor, and of course you have a mouse button. The complete system weighs 2.5 pounds; the remote uses a 9-volt battery, the base station uses an AC adapter.

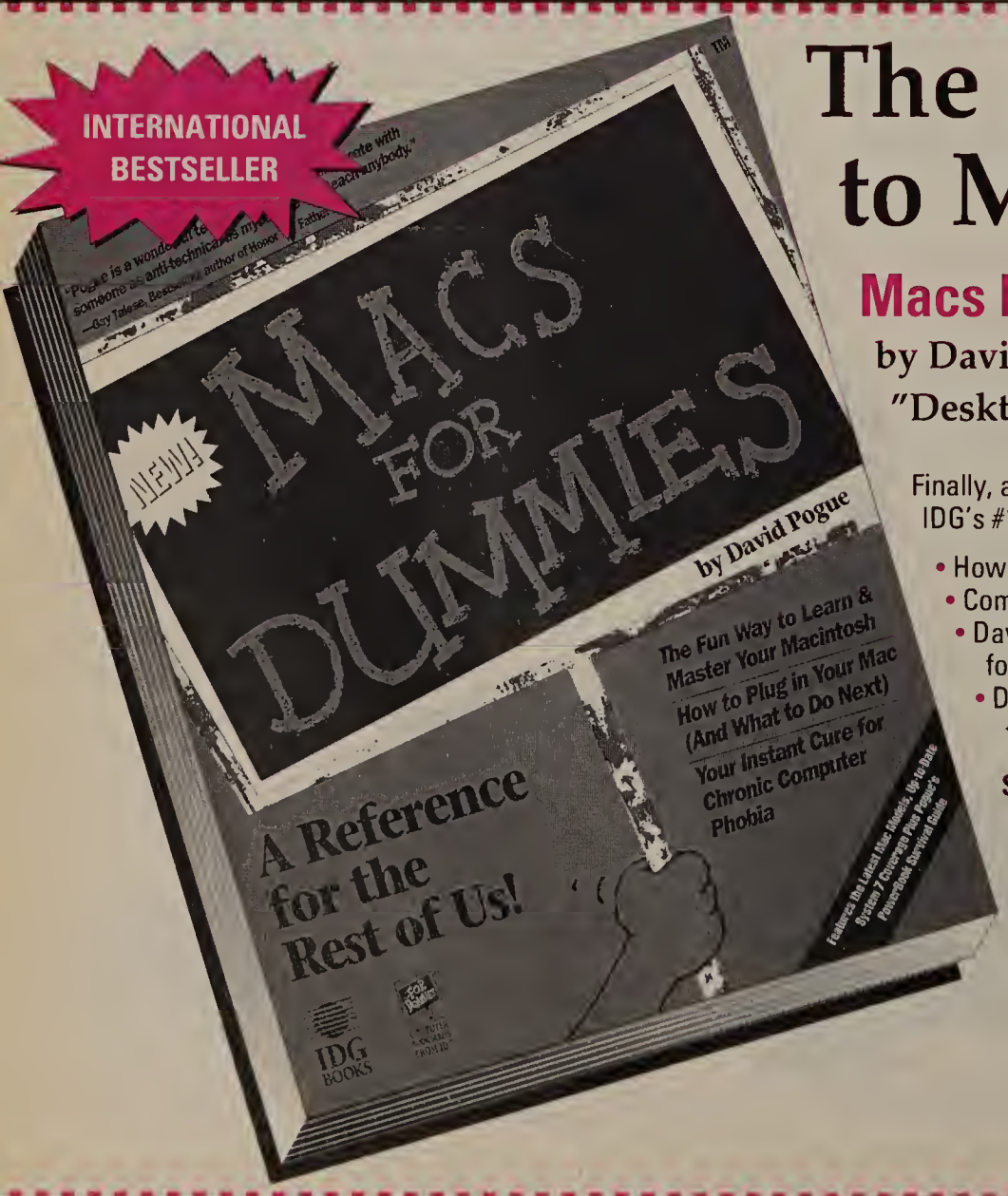
You can also use a mouse or a trackball with a long cord; make sure no one trips over the cord. The ADB cable is the same as the S-VHS or Y/C connector used by high-end VCRs; extension cords are sold by some electronics stores. If you use any remote pointing device, practice with it before your presentation until you can operate it smoothly.

For the Extravaganza

THERE'S STILL MORE. AIRMOUSE REMOTE Controls offers CoPilot, a $795 interface that commands up to six infrared-controllable devices—a laser disc player, stereo system, or what have you. The $70 CP290A Home Control unit from X-10 (USA) (201/784-9700) switches X-10–compatible devices from a Mac; the devices can control lighting, turn on sprinklers, or do just about anything that can be activated by a switch. MIDI, originally developed for musical instruments, can also control lighting as well as mix and edit sound. Passport Producer on a PowerBook with a MIDI interface can fade down the lights, open the curtains, start a motion-picture projector, and—after the movie—play along with a musical group.

The sky's the limit; let's get on with the show. **m**

CARY LU has given presentations at Harvard University, the Smithsonian Institution, Bell Telephone Laboratories, and IBM's Watson Research Center.



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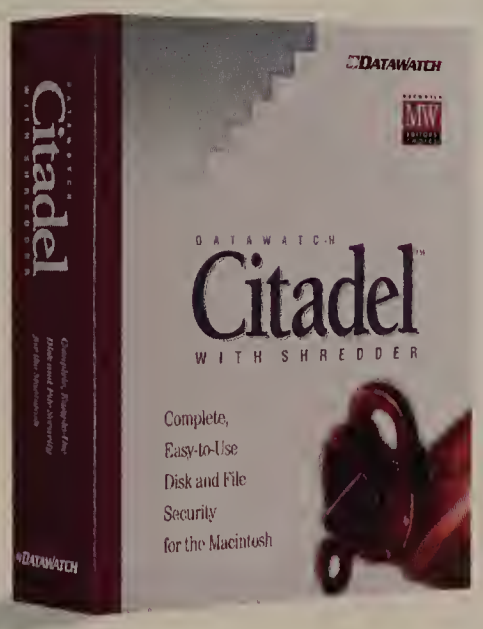
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Though Citadel has all the security features you need, you won't find it hard to set up or use. In fact, Macworld magazine called it "Feature packed; easy to use" (*Macworld*, 6/92), and chose it as its Editors' Choice among security products (*Macworld*, 2/93).

MACWORLD MW EDITORS' CHOICE

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Circle 37 on reader service card



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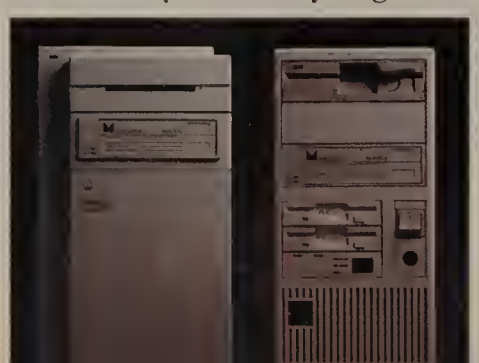


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MACWORLD

Star Ratings

OVER 400 HARDWARE AND SOFTWARE REVIEWS AT A GLANCE

Edited by Wendy Sharp

Macworld Star Ratings lets you compare hardware and software products for the Macintosh by providing summaries of hundreds of *Macworld*'s authoritative product reviews. The number of stars at the beginning of each capsule review indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones.

If a product has been upgraded since our last review, the most recent version number supplied by the vendor appears in parentheses after the reviewed version number. Key products that have not been rated since *Macworld* began assigning star ratings in April 1992 have a ◩ symbol before the name. To read a full review of any product in the listing, please consult the issue listed at the end of each synopsis.

Vendors: Please write to *Macworld Star Ratings*, 501 Second St., San Francisco, CA 94107, to inform us of changes in the version number or list price of your product, or of changes to your phone number.

★★★★★ Best ★ Worst

Software

ACCOUNTING/FINANCE

★★ **Andrew Tobias' TaxCut for Macintosh, MECA Software, 203/256-5000, $79.95.** The occasionally awkward interface of this personal tax-preparation software doesn't follow every Mac standard, but the help system is very good. State versions are available for California and New York. May 93

★★ **Business Sense 1.6, Business Sense, 307/877-2231, $199.** Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. Feb 93

★★★★ **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. Sep 92

◩ **Great Plains Accounting 6.0 (6.1), Great Plains Software, 701/281-0550, $795.** High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★★ **Job Cost/Time Billing 1.05, Satori Software, 206/443-0765, $1495.** Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. Aug 92

★★★ **MacInTax 1992, ChipSoft, 619/453-8722, $79.95.** It's difficult to correct your errors when using this personal tax-preparation software, but it's definitely easier than doing your taxes by hand. The display is attractive, the program supports electronic filing, and there are 15 state-tax versions available. May 93

★★★★ **Managing Your Money 5.0, MECA Software, 203/256-5000, $79.95.** An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. Jan 93

◩ **MYOB 3.0, Teleware, 201/586-2200, $199.** A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user who has no need for payroll capabilities, it's the best choice.

◩ **Quicken 3.0, Intuit, 415/852-9696, $69.95.** Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1, Timeslips Corp., 508/768-6100, $299.95.** Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. Sep 92

★★★ **WealthBuilder 2.0, Reality Technologies, 800/346-2024, $79.99.** Financial-planning software forces you to think about your money and helps you develop an investment plan. It's a good program for beginning investors, but more-sophisticated investors will want more-advanced features. May 93

BUSINESS TOOLS

★★★ **4D Server 1.0.1, ACI US, 408/252-4444, three users $1495, six users $2495, ten users $3495.** Database server uses the ingenious multitasking technology built into 4D to make it appear that each client has the full resources of the server. If you use 4D on a network, you need this product. Jun 93

★★★★ **4th Dimension 3.0.1, ACI US, 408/252-4444, $895.** Multitasking, which greatly improves speed in a carefully designed application, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. Apr 93

★★ **AccuZip6 1.5.2, Software Publishers, 714/846-1908, $899.** Professional-level mail-list management tool on CD-ROM is the most comprehensive system available, but its messy documentation and inexcusable user-interface violations make our reviewer reluctant to recommend it. May 93

★★★★ **Atlas Pro 1.0.6 (1.5), Strategic Mapping, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price. Nov 92

★★★ **Bar Code Pro 1.0, Synex, 718/499-6293, $450.** Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

★★★★ **DeltaGraph Professional 2.01 (2.02), DeltaPoint, 408/648-4000, $295.** A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds 13 new chart types and a number of presentation capabilities. May 92

★★★★ **Fair Witness 1.1 (1.2), Chena Software, 215/770-1210, $295.** A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. Oct 92

★★★ **FASTAT 2.0, SYSTAT, 708/864-5670, $495.** Statistical business-analysis software makes sense as a day-to-day statistics tool for business or scientific users. It provides the right statistical tests for most requirements, and its graph types provide plenty of information, although they lack glamour. Jun 93

★★★★ **FileMaker Pro 2.0, Claris Corp., 408/727-8227, $399.** Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. Jan 93

★★★ **FlowChart Express 1.0, Kaetron Software Corp., 713/890-3434, $149.** Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will need a larger, more powerful feature set. Jan 93

★★★★ **GeoQuery 3.02, GeoQuery Corp., 708/357-0535, $395.** Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create "pushpin" maps of files from your spreadsheet or database. Nov 92

★★★★ **GraphMaster 1.31a (1.33), Visual Business Systems, 404/956-0325, $295.** Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and 360-degree free rotation. A frequent inability to undo actions is the only serious irritation. May 92

★★★ **ithink 2.2.1, High Performance Systems, 603/643-9636, $695.** Although it requires a real training commitment for effective use, this product is an attractive dynamic business modeling system. It's a good bet for identifying cloudy spots in the crystal ball. May 93

continues



MACWORLD

Star Ratings

★★★★ **Lotus 1-2-3 for Macintosh 1.0 (1.1), Lotus Development Corp., 800/343-5414, $495.** Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system. Apr 92

★★★ **MacBarcoda 2.24, ComputaLabel, 508/462-0993, three-code version $349; single-code professional version $495; six-code professional package $895.** Compact, simple-to-use desk accessory creates bar codes in either EPS or Adobe Illustrator 1.1 format. DA cannot automatically create serial codes. Jun 93

★★★ **MacProject Pro, Claris Corp., 408/727-8227, $599.** If you're working on a midsize project and like using PERT charts (where tasks appear in boxes and are connected by straight lines), this may be the project-management software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. May 93

★★★★ **Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, $495.** Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and needs 2MB of RAM for practical use, but almost all users will want to upgrade. Oct 92

★★★★ **Microsoft Project 3.0, Microsoft, 206/882-8080, $695.** An amazing range of functions, including new scheduling and formatting, are packed into this project-management software. The improved tool bar helps novices schedule tasks with push-button ease. Jan 93

★★★ **Microsoft Works 3.0, Microsoft, 206/882-8088, $295.** Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatibilities, odd design choices, and performance flaws. Feb 93

★★★★ **Muse 1.0 (1.01), Occam Research Corp., 617/923-3545, $695.** Innovative data-analysis software is based on a large, ambitious vision of how to organize and use data, and is an excellent environment for some data handling. Free-form query language is powerful, but easy to misread. Jun 92

★★★★ **nuBase Pro 1.5 (1.54), Tactic Software Corp., 407/832-6691, $395.** Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. Sep 92

★★ **Office Wiz 1.1 (1.1.2), Oryx Associates, 415/563-9971, $695.** 4D-based program attempts to integrate calendar, project, and contact management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. Nov 92

★★★ **Omnis 7 1.1, Blyth Software, 415/312-7100, $1250.** The plain, businesslike functionality of this database-development system produces solid applications without much fuss. Dec 92

★★★ **OrgChart Express 1.0, Kaetron Software, 713/890-3434, $279.** Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worth it for people who regularly work with large or complex organization charts. Apr 93

★★★★ **Panorama 2.0 (2.06), ProVue Development Corp., 714/892-8199, $395.** Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. May 92

★★★ **Perspective 1.5, U.S. Data on Demand, 800/352-7352, $129.95.** The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. Sep 92

★★ **PowerPlay 1.0 (1.1), Cognos, 617/229-6600, $695.** A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tabulates them in several colorful ways. Aug 92

★★★ **SpreadBase 1.0.1, Objective Software, 415/306-7410, $695.** Powerful business data-analysis tool is a unique combination of database and spreadsheet functions. It's worth a close look for power users, despite meager documentation and a cranky macro language. May 93

★★★ **WordPerfect Works 1.2, WordPerfect Corp., 801/225-5000, $249.** A very good word processor, a spreadsheet, a database, charting, drawing, painting, and communications make up the seven well-integrated and flexible modules of this program. It has a few shortcomings, including some memory-management problems, but buyers should generally be pleased. Jun 93

COMMUNICATIONS/NETWORKS

★★★ **A/UX 3.0, Apple Computer, 408/996-1010, $709.** Hybrid–operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. Nov 92

★★★★ **AccessPC 2.0, Insignia Solutions, 415/694-7600, $99.95.** Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. Oct 92

★★★ **CompuServe Information Manager 2.0.1, CompuServe, 614/457-8600, $49.95.** The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. Dec 92

★★★ **DataClub Classic, DataClub Elite 2.0, Novell, 800/638-9273, $175, $1395.** Fully distributed file servers allow users to pool the free space on their drives into one virtual server. File sharing is transparent, but when a participating Mac disconnects from the network, users lose access to files stored on its hard drive. Aug 92

★★★★ **DOS Mounter 3.0, Dayna Communications, 801/531-0600, $89.95.** If you need to use wild cards in extension mapping, this file-transfer utility is the only option, although it's slower than other file-transfer programs. Oct 92

★★★ **Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, $79.** For basic file-transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. Oct 92

★★★ **MicroPhone II 4.0 (4.0.2), Software Ventures Corp., 510/644-3232, $295.** Refinements are evident throughout this telecommunications software's upgrade, but not everyone needs $295 worth of sophistication. The impressive scripting facility is countered by poor help features. Jul 92

★★★★ **MicroPhone Pro, Software Ventures Corp., 510/644-3232, $295.** Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. Apr 93

★★★ **NetMounter 1.00 (1.01), Dayna Communications, 801/531-0600, $99.** Reasonably priced utility provides Macs access to NetWare file servers without your having to install NetWare for the Macintosh on the server. It's not an ideal choice, but it is economical for mixed networks with only a few Macs. Sep 92

★★ **NetVirtual 2.0, Eclectec, 408/462-2040, $995, unlimited nodes $4985.** One-of-a-kind network-simulation product favors flexibility at the expense of usability. Only after hours of work will your simulation report anything meaningful about your network, and even then the results are difficult to analyze. Apr 93

◩ **NetWare for the Macintosh 3.011, Novell, 800/638-9273, $495-1995.** NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage. This set of NetWare Loadable Modules lets you add Macs to a NetWare network.

★★★ **Network SuperVisor 2.0.1 (2.1), CSG Technologies, 412/471-7170, $495.** Fast and accurate data collection is the strong point of this network-management utility, but the interface isn't that intuitive. Aug 92

★★★ **Network Vital Signs 1.0 (1.1), Dayna Communications, 801/531-0600, $449.** Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors. Unfortunately, when monitoring more than ten devices, it noticeably degrades the performance of the monitoring Mac. Mar 93

★★★★★ **NetWorks 1.0.1 (2.0), Caravelle Networks Corp., 613/596-2802, $995.** Become a network demigod with omnipresent capabilities over network devices using this network-management and paging utility. *Macworld*'s network manager loved it, calling it versatile, flexible, and worth its weight in gold. Jun 92

★★★★ **PacerForum 1.0.1, Pacer Software, 619/454-0565, $549.** Any file server or underused networked Mac can host an online forum using this network bulletin board system. The well-designed graphical interface stands out, although the display looks better on color monitors. Jul 92

★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, $895.** Keep your finger on the pulse of router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. Oct 92

★★ **SoftPC with Windows, Insignia Solutions, 415/694-7600, $499.** The emulation of a complete and accurate Windows environment on a Mac is an amazing accomplishment, but the product is so slow, even on a Quadra, that it performs in what might best be characterized as a dreamlike languor. Jun 93

★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, $129.** Collection of five separate applications provides essential network-monitoring tools at a price that would please anyone. Dec 92

★★★★ **Timbuktu 5.0.1, Farallon Computing,**

continues

There are two ways to get 600 dpi on a LaserWriter



1) Buy a new one

If the recent printer introductions have made you feel like you and your old printer have been left behind, there is good news. You don't have to trash your old printer to get the latest in print technology, like 600 x 600 dpi. Xante offers upgrades that will turn your existing LaserWriter® or HP® LaserJet® into a 600 dpi, high performance, PostScript® compatible printer.

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2) Upgrade

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IMAGING MAGAZINE PRODUCT OF THE YEAR 1992



	Accel-a-Writer™ Upgrade	LaserWriter® Pro 630	LaserJet® 4M
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Virtual Disk Technology	✓†		
Enhanced Gray Scale at 600 dpi	✓		
SCSI	✓	✓	
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Circle 1 on reader service card



MACWORLD

Star Ratings

510/814-5000, single user $199, multiuser $999 to $5500. By letting one computer (a Mac or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Despite minor blemishes, it's a clear winner. Mar 93

★★ **Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, $195 to $3500.** These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. Aug 92

◩ **WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, $139.** In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

DESKTOP PUBLISHING

★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, $795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. May 92

★★ **Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, $199.** Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners. Mar 93

★★★ **Apple Font Pack, Apple Computer, 408/996-1010, $99.** Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's not a bad deal, considering that Adobe PostScript fonts cost four times as much. Mar 93

★★★ **Expanded Book Toolkit 1.0.1, The Voyager Company, 310/451-1383, $295.** Using this hypermedia publishing program, average mortals can create highly functional multimedia books in a fraction of the time it would take to do the job unassisted. Be aware, though, that it's no QuarkXPress. Jun 93

★★★★ **Fontographer 3.5, Altsys Corp., 214/680-2060, $495.** Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. Nov 92

★★★ **Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, $199.99, full 180-character set $499.99.** Type 1 font made from your handwriting has clean, even lines—whether or not your writing does. Apr 93

★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, $249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects, such as gradient fills. Oct 92

★★ **MacQuill 1.0, Nest Software, 408/441-1944, $99.95.** Friendly, inexpensive page-layout program is missing basic features, such as kerning and importing, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable. Aug 92

★★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, $370.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. Jul 92

★★★ **Personal Font, Signature Software, 408/458-0241, $179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. Dec 92

★★★ **Publish It Easy 3.0, Timeworks, 708/559-1300, $199.95.** Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★★★ **QuarkXPress 3.1, Quark, 800/788-7835, $895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. Jul 92

★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, $695.** A strange mixture of power and oversight, this page-design and -layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. Dec 92

★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, $79.95.** Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. Jan 93

★★★★ **SuperATM, Adobe Systems, 415/961-4400, $149.** This upgrade to Adobe Type Manager lets you view Adobe-brand PostScript fonts on screen and output them at high resolutions, even when the corresponding printer fonts are unavailable. Although it has limitations, this is an outstanding advance in font technology and a tremendous value. May 93

EDUCATION

★★★★ **Algebra, Broderbund Software, 415/382-4400, $89.95, school edition $99.95.** Interactive, imaginative math tutorial is keyed to the standard textbook order of topics, but offers much more. It is particularly strong on word problems and graphing. May 93

★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, $49.95.** After applying for a job as a lab assistant with the local mad scientist, use logic and raw brain-power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious. Dec 92

★★ **Comprehensive Review in Biology, Queue, 203/335-0908, $295.** There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what this CD-ROM is. May 93

★★★ **Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, $795.** The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD-ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★ **Dvorak on Typing 1.0, MacPlay, 714/553-3530, $49.95.** Typing tutor offers solid lessons, but the small annoyances, such as never being able to take intermediate or advanced lessons without first passing a test, add up. Jun 93

★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, $59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, $59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

★★★ **MacGlobe 1.3.0, Broderbund Software, 415/382-4400, $59.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for home and school use. Feb 93

★★★★ **Mavis Beacon Teaches Typing 2.0, The Software Toolworks, 415/883-3000, $49.95.** If being entertained while learning to type interests you, this typing tutor provides varied environments, interesting lessons, and good games. Jun 93

★★★★ **The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, $395.** The remarkably current and scholarly text of this encyclopedia on CD-ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, $623.** Although this Japanese language CD-ROM offers solid instruction, it's so expensive and so limited in its word selection that it's not an economical choice for individual users. Jan 93

★★ **Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, $69.95.** If you add custom word lists, this interactive French-English picture dictionary may serve as a decent aid to a more complete curriculum, but it's buggy and of uneven quality. Aug 92

★★ **The Secret Codes of C.Y.P.H.E.R. 1.0 (1.1), Tanager Software Productions, 510/430-0900, $59.95.** Intriguing facts about mammals and a variety of alphabets provide the interest in this educational game, but the inescapable, repetitive animations are a major detraction. Apr 93

★★★ **The Secret Island of Dr. Quandary 1.0, MECC, 612/569-1500, $49.95, teacher's edition $69.95.** Clever package of gorgeous landscapes, catchy sounds, and tempting arcade-game puzzles uses math, logic, and reading skills. Although somewhat slow, it's fun for parents and kids. Jun 93

★★★ **Stickybear's Reading Room 2.2a, Optimum Resource, 803/785-7441, $59.95.** Educational game with four different activities takes a sedate but direct path to building primary-level reading skills. It's appropriate for ages four to eight, but probably too juvenile for older kids. Jun 93

★★★ **Time Treks 1.0, Earthquest, 415/321-**

5838, $59.95. An eccentric archaeologist opens portals through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. Sep 92

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, $139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. Oct 92

★★★★ **Where in America's Past Is Carmen Sandiego?, Broderbund Software, 415/382-4400, $44.95.** Travel through time and the U.S. chasing those V.I.L.E. crooks in this clever educational history/geography game that's challenging for all ages. Mar 93

★★★★ **Where in the World Is Carmen Sandiego? Deluxe Edition, Broderbund Software, 415/382-4400, $79.95.** The V.I.L.E. gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

ENTERTAINMENT

★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, $49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection, geometric figures, and the inability to save games in progress make it less enticing. Sep 92

★★★★ **A-Train, Maxis, 510/254-9700, $69.95.** Charming railroad simulation offers astonishing, and often witty detail, but the learning curve is high and the interface isn't completely Mac-like. Apr 93

★★ **America Alive, MediaAlive/CD Technology, 408/752-8500, $99.** QuickTime movies, color photographs and maps, text, and audio mingle in this multimedia CD-ROM guide to the United States. It's a promising concept, but it doesn't yield much useful information. Mar 93

★★★★★ **Arthur's Teacher Trouble, Brøderbund Software, 415/382-4400, $59.95.** Every page of this delightful animated book is dense with surprises that arouse and satisfy a child's curiosity. In the words of six-year-old Alex, "It's like chocolate ice cream. You can have it more than once and it's still good." Apr 93

★★★ **Audioshop 1.0 (1.03), Opcode Systems, 415/856-3333, $89.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD-ROM player. A number of quirks may confuse new users. Sep 92

★★★ **Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, $79.95.** Elaborately detailed cartoon characters act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. Mar 93

★★★ **The Battle of Britain, Deadly Games, 215/295-2284, $54.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. Dec 92

★★★ **Blade 1.1 (2.0), Leviathan Corp., 313/826-3560, $99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. Sep 92

★★★ **Capitalist Pig 1.0 (1.02), Pluma Software, 602/969-9441, $59.95.** Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business-simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. Sep 92

★★★ **Cogito 1.0, Inline Design, 203/435-4995, $59.95.** Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. The deviously simple twist is that clicking on the arrows that control movement results in reactions that are more and more complex as you progress through the 120 levels. Apr 93

★★★ **Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, $179.95.** No unnecessary frills complicate this efficient, inexpensive instrument-flight trainer. It doesn't have a true aerodynamic feel, but that flaw's not critical. Jul 92

★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, $49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. Sep 92

★★★★ **Go Master 5, Toyogo, 808/396-5526, $69.** Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. Dec 92

★★★★ **Hellcats Over the Pacific 1.0.3, Graphic Simulations, 214/699-7400, $69.95.** Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. Apr 93

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, $28.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. Feb 93

★★★★ **Jewelbox 1.5, Varcon Systems, 619/563-6700, $49.95.** This gem of a game is strongly reminiscent of Tetris. The jewels fall into rows that disappear when you place three jewels of a kind together. Jun 93

★★★★★ **Just Grandma and Me, Broderbund Software, 415/382-4400, $49.95.** Mercer Mayer's Little Critter comes to life in this charming, captivating, wondrously entertaining, interactive storybook on CD-ROM. Aug 92

★★★ **Kid Pix Companion, Broderbund Software, 415/382-4400, $39.95.** Addition to Kid Pix adds clever new features, including the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. Oct 92

★★★★ **Maelstrom 1.03, Ambrosia, P.O. Box 23140, Rochester, NY 14692-3140, $15 plus $5 shipping and handling.** Fast-paced arcade game is loosely modeled after Asteroids, the Atari classic. Maelstrom features superb animation, hilarious sound effects, exciting action—and best of all, it's shareware. Jun 93

★★★★ **Monkey Island 2: LeChuck's Revenge, LucasArts Games, 415/721-3394, $59.95.** This whimsical Twilight Zone of life on the high seas is the adventure-game equivalent of *Mad* magazine, filled with witheringly sarcastic dialogue, splendid gross-out jokes, heapings of self-parody, and enough hilarious detail to keep you amused for days. May 93

★★★ **Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, $59.95.** This CD-ROM includes an unusual essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped mini lecture on Mozart's life, but sadly enough the music is limited almost entirely to the title piece. Apr 93

★★ **The Orchestra: The Instruments Revealed, Warner New Media, 818/955-9999, $79.98.** The many-branched, interwoven hypertext style of this music-education CD-ROM makes the program hard to navigate and digest, despite its richness. For the price, other music-education CD-ROMs present better values. Apr 93

★★★★ **Patton Strikes Back: The Battle of the Bulge, Broderbund Software, 415/382-4400, $19.95.** Military simulation game with superior graphics is simple to learn and satisfyingly complex. If only they'd skipped the off-disk copy protection. Jun 92

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, $29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD-ROM that combines the excitement of the stage with the reflective appeal of the page. Feb 93

★★★★ **Prince of Persia, Broderbund Software, 415/382-4400, $49.95.** A high tolerance for frustration is necessary to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it worthwhile. Sep 92

★★★ **Red Baron 1.0, Dynamix, 800/326-6654, $69.95.** The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. Nov 92

★★★★ **Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, $59.95.** *Don Juan, Till Eulenspiegel,* and *Death and Transfiguration* are the three works included in this CD-ROM, with a program written by Russell Steinberg. The musical analysis is satisfying and the lush orchestral music will appeal to both novice and experienced classical music listeners. Apr 93

★★★ **Rodney's Wonder Window, The Voyager Company, 310/461-1383, $39.95.** Collection of 23 colorful, wacky graphics and animations by Rodney Alan Greenblat is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. Mar 93

★★★ **Schubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, $59.95.** Alan Rich, classical music commentator for National Public Radio, conveys his enthusiasm for this appealing music in this CD-ROM's lively text. However, the discussion is relatively unchallenging and the musical performance, though well regarded, is not at the top of most reviewers' lists. Apr 93

★★★★ **The Secret of Monkey Island 1.0,**

continues



MACWORLD

Star Ratings

LucasArts Games, 415/721-3300, $59.95. A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and irksome copy protection only slightly spoil the delight. Sep 92

★★ **Sherlock Holmes, Consulting Detective 1.0, Icom Simulations, 708/520-4440, $69.95.** Accompany Sherlock Holmes and Watson as they investigate three CD-ROM–based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. Aug 92

★★★ **Sherlock Holmes, Consulting Detective, Volume II, Icom Simulations, 708/520-4440, $69.95.** Match wits with the legendary detective by solving three difficult mysteries in this CD-ROM game. May 93

★★★ **SimLife, Maxis, 510/254-9700, $69.95.** A megalomaniac's dream come true, this amazingly intricate simulation allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, $24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD-ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. Feb 93

★★★ **Space Quest 1: Roger Wilco in the Sarien Encounter, Sierra Online, 209/683-8989, $29.95.** As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. Puzzles range from the obvious to the head-scratching, but for most players the game will be easy to complete. Apr 93

★★★★ **Spaceward Ho 2.0.1, Delta Tao Software, 408/730-9336, $59.** A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. Aug 92

★★★★ **Spelunx and the Caves of Mr. Seudo, Brøderbund Software, 415/382-4400, $49.95.** Unanticipated giggles, rich graphics, entertaining sounds, and creative learning activities fill this interactive hyperworld. We recommend it, despite its tiny bugs. Jul 92

★★★ **Super Mines 1.0, Callisto Corp., 508/655-0707, $49.95.** You use logic to search a minefield without setting off mines in this fast-paced game that's easy to learn, but offers 84 levels for long playability. Apr 93

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95.** Teensy tiles are a minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, $59.95.** Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

★★★ **Warlords, Strategic Studies Group, 904/494-9373, $59.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. Dec 92

★★★★ **Who Killed Sam Rupert, Creative Multimedia Corp., 503/241-4351, $39.99.** You're a police detective trying to solve the murder of a popular restaurateur in this interactive CD-ROM that exploits the full range of multimedia options and provides a wealth of clues and surprises to hold your interest. May 93

★★★★ **Wordtris, Spectrum HoloByte, 510/522-3584, $49.95.** Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. Jun 92

GRAPHICS

★★★ **Adobe Dimensions, Adobe Systems, 415/961-4400, $199.** This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript and is an excellent tool for anyone who works extensively in Adobe Illustrator or Aldus FreeHand. Apr 93

◩ **Adobe Illustrator 3.01, Adobe Systems, 415/961-4400, $695.** Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

★★★★ **Adobe Photoshop 2.5, Adobe Systems, 415/961-4400, $895.** No graphics program is as universally loved and as downright deserving of user loyalty as this one, but while this upgrade builds on the program's wide range of capabilities, it ignores some minor weaknesses that have begun to peek through the product's armor. It's still great but perhaps not perfect. Jun 93

★★★ **Aldus FreeHand 3.1 (3.11), Aldus Corp., 206/628-2320, $595.** A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. Jun 92

★★★ **Alias Sketch 1.0.2 (1.5), Alias Research, 800/447-2542, $995.** The unique collection of tools makes this the only program that allows you to sit down and play with 3-D rendering. Failings include quirky navigation and sluggish performance. Aug 92

★★★★ **ArchiCAD 4.02 (4.1), Graphisoft USA, 415/737-8665, $4450.** The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most of the features an architect needs. Jun 92

★★ **ArtBeat Professional 1.0, Pie Practical Solutions, 201/902-9500, $249.** Despite a smattering of unique capabilities, this inexpensive draw and paint program lacks many of the features of equivalent programs. Apr 93

★★★ **artWorks 1.0, Deneba Software, 305/596-5644, $149.** If you're expecting a graphics dynamo, this combination painting and drawing program will leave you a little cold. But despite its flaws, it ranks as one of the best graphics programs available under $200. Jun 93

★★ **AutoCAD Release 11, Autodesk, 415/332-2344, $3500.** Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. Dec 92

★★★ **CA-CricketDraw III 1.0, Computer Associates International, 408/432-1727, $249.** Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. May 92

★★★ **Cachet 1.0, Electronics for Imaging, 415/742-3400, $595.** The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. Dec 92

◩ **Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, $399.** Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision drawing functions in particular should appeal to many users.

★★★ **Color It 2.0.1, Timeworks, 708/559-1300, $299.95.** Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. Apr 93

★★ **CPM Graphic Tutor 1 & 2, Caseys' Page Mill, 303/220-1463, $489 per volume.** Although some neophytes may find these CD-ROM tutorials on Adobe Illustrator and Adobe Photoshop helpful, the programs' distracting interfaces, inconsistent execution, lack of polish, and high price weigh strongly against them. May 93

★★★ **DesignCAD 2D/3D 3.0.1, DesignCAD, 918/825-4848, $299.95.** Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. Nov 92

★★★★ **ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495.** The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. Feb 93

★★★★ **Expert Color Paint 1.0, Expert Software, 305/567-9990, $49.95.** A wonderful value for novices, this color paint program offers a tidy collection of features for an astonishingly low price. Beware of low memory settings, though, or it gets buggy. Jun 92

★★★★ **Fractal Design Painter 1.2 (2.0), Fractal Design Corp., 408/688-8800, $349.** An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unsophisticated gradation and fill capabilities and an insensitive Undo command. Aug 92

★★ **Image Assistant 1.0, Caere Corp., 408/395-7000, $495.** Besides unsatisfactorily addressing Adobe Photoshop's small list of liabilities, this image-editing software is barely able to keep up with less expensive bitmap editors. Problems include an unforgivable lack of antialiased text, no selective revert function, and an incorrectly implemented smudge tool. Apr 93

★★★★ **Infini-D 2.0 (2.5), Specular International, 413/549-7600, $995.** Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. Jan 93

★★★★ **IntelliDraw 1.0, Aldus Corp., 206/628-2320, $299.** Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although

continues

How Butterflies Transform

The butterfly passes through several stages in its glorious transformation from egg to the completed creature that we all visualize as the butterfly. The adult female lays between one hundred and several thousand eggs throughout her lifetime each with the potential of becoming an adult butterfly itself.

Each egg, so tiny that it can only be seen by the human eye with the help of a microscope, is laid on or near a plant on which the newly hatched grub will be able to feed. These eggs are often green or yellow, but can also be found in shades of blue or red, each with a shell-like design covering it.

Usually in the spring or summer a tiny caterpillar, or grub, will hatch from the egg. This wormlike creature almost immediately begins to feed as it will consume the majority if not all of its nutrients during this phase of its life.

The caterpillar will continue to eat until it has eaten so much that its skin can no longer contain the newly acquired mass. The skin then bursts and the caterpillar will shed it in order to have it replaced by a newer and larger one. This process continues for weeks as the caterpillar increases in size, several times its original mass.

Often during the time of fall, the caterpillar will then either spin a silken pad from which it suspends itself by its hind legs or it will fasten its body upright by silken threads to a twig creating a chrysalis or exposed pupa. Usually after spending the winter months dormant, the final stage of transformation will take place.

The shell of the chrysalis is broken open and the creature that emerges is barely recognizable as the butterfly that it will become. Its wings are crumpled and kept close to its moist limp body. It will remain clinging to the cocoon or a nearby branch as its form gradually begins to become dry and firm.

It moves its wings slowly at first with little strength but as they dry it is soon ready to take flight. The creature that ascends into the air has been through its final stage of development and is now the completed butterfly. This butterfly is now called the impago, or perfect insect.

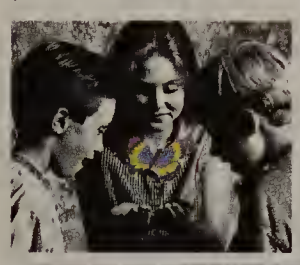
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The butterfly passes through several stages in its glorious transformation from egg to the completed creature that we all visualize as the butterfly. The adult female lays between one hundred and several thousand eggs throughout her lifetime each with the potential of becoming an adult butterfly itself.

Each egg, so tiny that it can only be seen by the human eye with the help of a microscope, is laid on or near a plant on which the newly hatched grub will be able to feed. These eggs are often green or yellow, but can also be found in shades of blue or red, each with a shell-like design covering it.

Usually in the spring or summer a tiny caterpillar, or grub, will hatch from the egg. This wormlike creature almost immediately begins to feed as it will consume the majority if not all of its nutrients during this phase of its life.





The caterpillar will continue to eat until it has eaten so much that its skin can no longer contain the newly acquired mass. The skin then bursts and the caterpillar will shed it in order to have it replaced by a newer and larger one. This process continues for weeks as the caterpillar increases in size, several times its original mass.

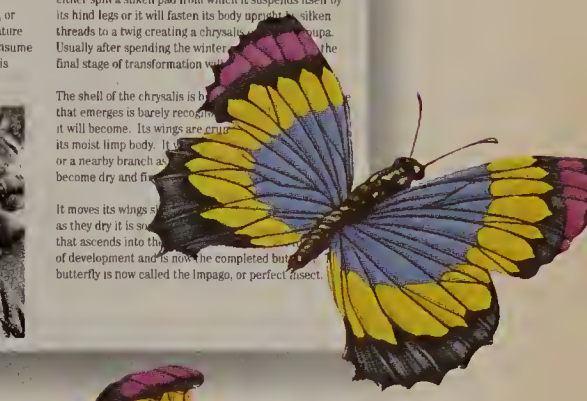
Often during the time of fall, the caterpillar will then either spin a silken pad from which it suspends itself by its hind legs or it will fasten its body upright by silken threads to a twig creating a chrysalis or exposed pupa. Usually after spending the winter months dormant, the final stage of transformation will take place.

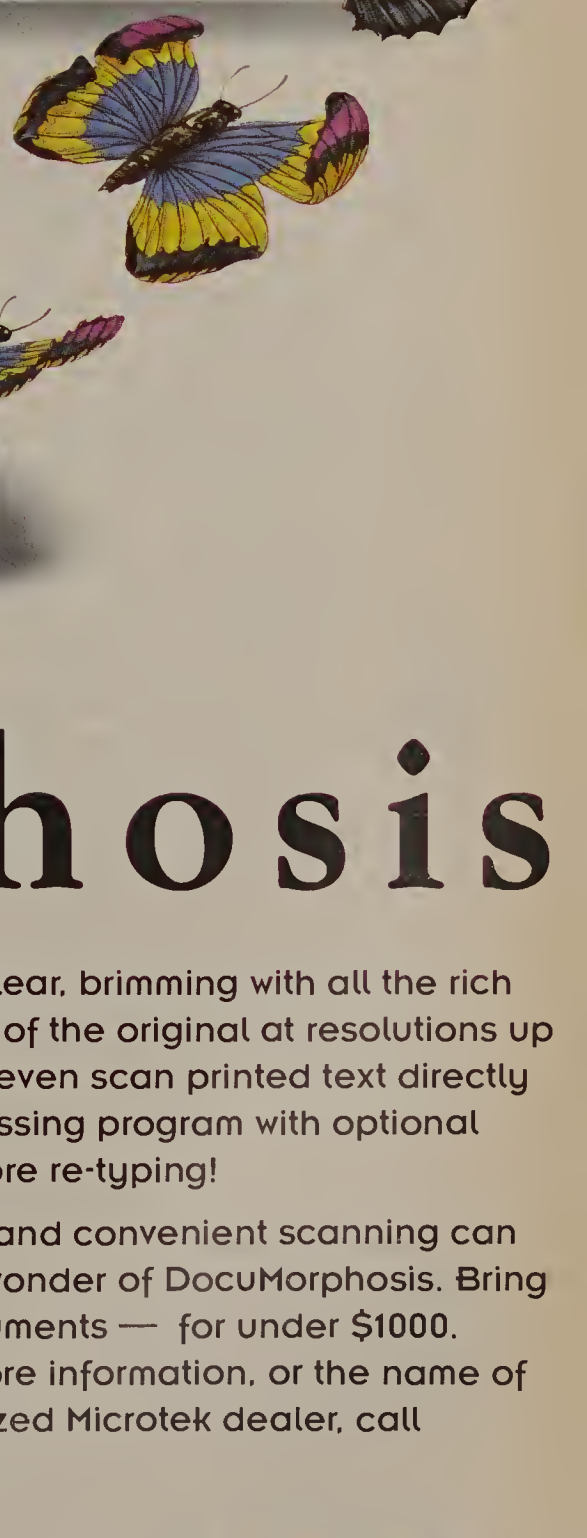
The shell of the chrysalis is broken open and the creature that emerges is barely recognizable as the butterfly that it will become. Its wings are crumpled and kept close to its moist limp body. It will remain clinging to the cocoon or a nearby branch as its form gradually begins to become dry and firm.

It moves its wings slowly at first with little strength but as they dry it is soon ready to take flight. The creature that ascends into the air has been through its final stage of development and is now the completed butterfly. This butterfly is now called the impago, or perfect insect.









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Circle 146 on reader service card



MACWORLD

Star Ratings

it's less satisfying as a free-form drawing tool. Nov 92

★★★★ **Kai's Power Tools Volume 1 1.0, HSC Software, 310/392-8441, $149.** Photoshop plug-ins include image-editing filters; texture, gradient, and fractal generators; and special-effects tools. Although at times monstrously complicated, this collection represents a virtually infinite supply of visual resources. It's an amazing tool that no regular Photoshop user should be without. May 93

◩ **MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695.** This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

★★★★ **MiniCAD+ 4, Graphsoft, 410/461-9488, $795.** Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features-champion status and is easier to use. Mar 93

★★★★ **Paint It 1.0, Timeworks, 708/559-1300, $59.95.** Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

★★★★ **Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, $895.** Experienced 3-D aficionados will find this 3-D–imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. Sep 92

★★★ **Showplace 1.1 (1.1.1), Pixar, 510/236-4000, $695.** Straightforward graphics application organizes shading and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. Jun 92

★★★★ **Sketcher, Fractal Design, 408/688-8800, $149.** A variety of effects reproduce styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★★ **Smoothie 1.02, Peirce Software, 408/244-6554, $149.** Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. Nov 92

★★ **StrataType 3d 1.0, Strata, 801/628-5218, $295.** The rulers, texture palette, custom bevels, and canned positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. Mar 93

◩ **Swivel 3D Professional 1.0 (2.0), Macromedia, 415/252-2000, $695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

★★★ **Tree, Onyx Computing, 617/876-3876, $295.** Single-purpose program generates lifelike color drawings of trees from a number of easily controlled parameters. Although visually appealing, it's an expensive way to draw a tree. May 93

★★★ **Typestry 1.0 (1.1), Pixar, 510/236-4000, $299.** Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. Nov 92

★★ **Zeus 0.91 (0.92), Delta Tao Software, 408/730-9336, $499.** Color paint program tries hard to match capabilities found in more expensive programs, but not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

MATH/SCIENCE

★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, $159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

★★★★ **Data Desk 4.0, Data Description, 607/257-1000, $595.** For finding patterns in data, this statistical-analysis program has no peer. Years of refinement have made it a unique, and uniquely valuable, tool for analysis, despite its lack of some tests found in larger programs. May 93

★★★★ **Entrypaq 3.0, Albathion Software, 415/824-2737, $149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. Nov 92

★★★ **Expert Astronomer 1.0, Expert Software, 305/567-9990, $49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

★★★★ **Expressionist 3.0, Prescience Corp., 415/543-2252, $199.95.** If you work regularly on similar topics, you can customize this equation-writing software so that it produces equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

★★★★ **HiQ 1.0 (2.0), Bimillennium Corp., 408/866-2010, $695.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

★★★★ **MacBreadboard 1.1, Yoeric Software, 919/644-1620, $59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

★★★★ **MacPhase 1.2, Otter Solutions, 315/768-3956, $159.** Low-cost, scientific-data-visualization software with a large assortment of mathematical tools is one of the few authentic bargains in science software. One of its principal strengths is a well-planned color lookup table editor that's delightfully easy to use. May 93

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, $450.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

★★★ **MathCAD 3.1, MathSoft, 617/577-1017, $495.** Numerical and symbolic computation software is easy to learn, easy to use, produces good reports, and is much more powerful than earlier versions. It still doesn't compete in scope with the largest math programs, but for most science and engineering tasks, it's a fast way to get problems solved. Jun 93

★★★★ **MathType 3.0, Design Science, 310/433-0685, $199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

★★★ **Minitab 8.2, Minitab, 814/238-3280, $695.** These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Minitab an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jun 92

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

★★★★ **Sequencher 2.0, Gene Codes Corp., 313/769-7249, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

★★★ **SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, $495.** This scientific graphing software offers a short path from raw data to publishable graphs. The Mac fundamentals need polish, but the program offers unique analytic capabilities. Jul 92

★★★ **Simulink 1.2, The MathWorks, 508/653-1415, $3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★ **StatView 4.0m, Abacus Concepts, 510/540-1949, $595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **Theorist 1.5, Prescience Corp., 415/543-2252, $449.95.** Symbolic-mathematics program that you can figure out by yourself adds a useful table feature, more special functions of physics, and better graphics. Plus, it's still the only program to use real notation directly. May 93

ORGANIZATION/PRODUCTIVITY

★★ **ACT 1.0, Contact Software International, 214/919-9500, $395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

★★★ **Active Memory 2.0, ASD Software, 714/624-2594, $199.** Personal organizer distinguishes itself by providing strong network support, although it may be overkill for a lone user. Aug 92

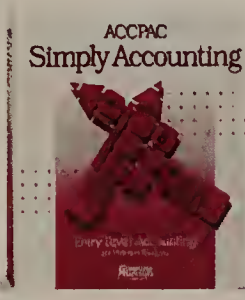
★★★★ **Agent DA 2.0 (2.1.1), TeamBuilding Technologies, 514/278-3010, $129.** Simple, flexible calendar/reminder program includes every obvious cal-

continues

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Circle 141 on reader service card



MACWORLD

Star Ratings

endar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. Sep 92

★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, $59.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

★★ **Connections 2.1, Concentrix Technology, 415/358-8600, $199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

★★★★ **DateBook 1.5.1, After Hours Software, 818/780-2220, $125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

★★★★ **DayMaker 2.0 (2.03), Pastel Development Corp., 212/941-7500, $129.95.** If you need to organize lots of disparate information, follow up on meetings with many people, keep track of your own calendar, create an archive of completed work, and print out lists of to-do items to take on the road, this free-form personal information manager is a great choice. May 93

★★★ **Dynodex 3.0, Portfolio Software, 408/252-0420, $89.95.** The speed and printing options of this field-based address-book manager are its strengths, but this upgrade adds welcome improvements to the interface, including automatic formatting of phone numbers. Apr 93

★★★ **EasyAlarms 2.0.3, Essential Software, 914/889-8365, $99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

★★ **Hello, Atelier Systems, 619/453-4300, $99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, $295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

★★★ **Intouch 2.0.4, Advanced Software, 408/733-0745, $99.95.** Free-form database is a fast and easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although this version adds a handy reminder system, it falls short as a calendar planner. Feb 93

★★★ **LapTrack For the Mac 1.0b, Timeslips Corp., 508/768-6100, $79.95.** Time- and expense-tracking program offers the right features for the on-the-go professional, but the interface is overcomplicated and the documentation is sloppy. Still, in spite of its flaws, it does an excellent job. May 93

★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, $34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

★★★★ **Now Up-to-Date 2.0, Now Software, 503/274-2800, $99; five-user version $449; ten-user version $799.** Calendar utility combines flexibility, ease-of-use, and streamlined operations in an almost irresistible package. The Reminder control panel, while a great new feature, has had minor conflicts. Jun 93

★★★ **Office Manager 2.1 (2.5), White Crow Software, 800/424-0310, $99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its usefulness for low-end Macs. Dec 92

★★★★ **Spiral 1.0, Technology Works, 512/794-8533, $129.** Designed specifically for taking and organizing notes, this product provides an excellent feature set, including tabs, bookmarks, and an option for automatically expanding abbreviations, but it's marred by some annoying errors in the editing and import/export processes. Mar 93

★★ **TimeVision 1.0, Powercore, 815/468-3737, $99.** New scheduler with notepad and card-file functions tacked on has some worthwhile features, but in general doesn't match up to the competition. May 93

★★★ **TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, $125.** Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. Aug 92

PRESENTATION TOOLS

★★★★ **Action 1.0, Macromedia, 415/252-2000, $495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

★★★★ **Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/961-4400, $495.** A dream command post for video professionals, this QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. Jan 93

◩ **Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, $495.** For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, $149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★★ **Cinemation 1.0, Vividus Corp., 415/494-2111, $495.** Easy-to-use program merges animation, interactivity, and presentation features, but image- and text-handling capabilities are less than stellar. Jul 92

★★ **Comet CG 1.0.3, AT&T Graphics Software Labs, 317/844-4364, $995.** Program for generating antialiased test over live video is reasonably priced compared with dedicated graphics systems, but you're likely to be as astonished by its limitations as you are impressed by its capabilities. It offers too few formatting options, a cumbersome interface, and an insubstantial manual. May 93

★★★ **DiVA VideoShop 1.0, DiVA Corp., 617/491-4147, $599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. Jul 92

★★★ **Interactive Training for Director 1.1, Media In Motion, 415/621-0707, $199.** This somewhat expensive program teaches basic Macromedia Director skills and provides a foundation for exploring Director's other features. It has a clear, often lighthearted approach, but navigating the lessons can be frustrating. Jun 93

★★★ **Macromedia Director 3.1, Macromedia, 415/252-2000, $1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping $149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

★★★ **Magic 1.0 (1.1), Macromedia, 415/252-2000, $395.** Outstanding editing features make this multimedia-presentation software easy to master. Many of the features of more-complex programs are missing, but what it does, it does well. Aug 92

★★★ **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, VHS $195; S-VHS, Hi8, and 3/4SP $295; BetaCamSP $495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic to genuinely funny. Apr 93

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, $495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

★★★ **Morph 1.0, Gryphon Software Corp., 619/454-6836, $149.** With patience and practice, you can become a high-tech special-effects wizard using this image-melding movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

★★ **Motion Works ProMotion 1.0 (1.02), Motion Works, 604/685-9975, $395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. Nov 92

★★ **MovieWorks 1.1, Interactive Solutions, 415/377-0136, $395.** Over 100 bugs were fixed in version 1.1 of this multimedia authoring software that takes an all-in-one approach to creating presentations, but problems remain. For now, it's a good idea, poorly executed. Jun 93

★★★ **Passport Producer 1.0, Passport Designs, 415/726-0280, $495.** Strong timing controls and good sound capabilities mix with middling text- and image-handling and a lack of even basic animation options in this partially successful entry-level multimedia program. Apr 93

★★★ **Special Delivery 1.0, Interactive Media Corp., 415/948-0745, $399.** While this entry-

level multimedia package has all the tools you need to assemble interactive screen presentations that burst with motion and sound, it has a disorienting interface and lacks the polish and power of other similarly priced programs. Mar 93

PROGRAMMING

★★★ **Ed5cheme 3.4, 5chemers, 305/776-7376, $49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create stand-alone applications. Nov 92

★★★ **EI5ToolKit 2.0, MicroStrategy, 302/427-8800, $1995.** Reliable, field-tested developer's environment for creating executive information systems provides automatic access to information in spreadsheets and databases across a distributed system, and serves up the information on screens that provide automatic graphing, analysis, and report generation. May 93

★★★ **MetaDesign for the Macintosh 3.0, Meta 5oftware Corp., 617/576-6920, $250.** This diagramming tool for structured systems analysis offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at austere, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

★★★★ **Object Master 1.0.2, ACI U5, 408/252-4444, $395.** Successful combination of the superior object-management facilities typically found in Smalltalk, and a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

★★★★ **Prograph 2.5, TG5 5ystems, 902/455-4446, $495.** Elegantly designed, object-oriented development environment simplifies Macintosh programming. The graphics-based program is conceptually more advanced than traditional object-oriented programming. Jun 92

★★★ **Serius Programmer 3.0, 5erius Corp., 801/261-7900, $395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

★★★★ **Think C 5.0, 5ymantec Corp., 408/253-9600, $299.** While not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. Jul 92

★★★★★ **Think Pascal 4.0, 5ymantec Corp., 408/252-3570, $249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

★★★★ **UserLand Frontier 1.0 (2.0), UserLand 5oftware, 415/369-6600, $249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, repetitive data-managements tasks, and more. Scripts can only be used on computers with copies of the program. Jul 92

UTILITIES

★★★ **ALSoft Power Utilities 1.0.1 (1.0.2), AL5oft, 713/353-4090, $129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterJuggler) separately, but the other five utilities are unimpressive. Aug 92

★★★★ **At Ease, Apple Computer, 408/996-1010, $59.** Sweet, simple, secure substitute for the Finder displays a clean, attractive page full of oversize icons where a single click launches a program or document. To delete, rename, or move files, you have to return to the Finder. Mar 93

★★★ **AutoDoubler 1.0.7 (2.0), 5alient 5oftware, 415/321-5375, $79.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. Sep 92

★★★ **BetterWriters 1.0.1 (1.0.3), GDT 5oftworks, 604/291-9121, $69.** Smart drivers teach your ImageWriter, StyleWriter, or DeskWriter laser printer tricks, letting it perform printing gymnastics such as inverting images and adding a variety of options for improving output. Minor incompatibilities with some common applications are inconvenient. Jul 92

★★★★ **Conflict Catcher and Other Innovative Utilities 1.0, Casady & Greene, 408/484-9228, $79.95.** Enable or disable INITs and start-up items when you boot, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you already own another INIT manager. Mar 93

★★★ **Copyright, CSG Technologies, 412/471-7170, $49.** If you can justify spending $49 purely for the sake of efficiency, this straightforward utility replaces the Finder's copy function, unobtrusively copying files to or from your Mac, in the background, while you move on to more interesting things. Apr 93

★★★ **CPU 1.0j (2.0), Connectix Corp., 415/571-5100, $99.** Indispensable items mix with trivial ones in this collection of utilities for the PowerBook. It's a relatively inexpensive way to turn any PowerBook owner into a full-fledged power user. Apr 93

★★★ **DiskFit Direct 1.0, Dantz Development Corp., 510/849-0293, $49.95.** Basic but efficient backup system is simple and painless enough to foster better backup habits in anyone who uses it. It doesn't back up to hard drives or tape drives. May 93

★★★ **Drive 7 2.3, Casa Blanca Works, 415/461-2227, $79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

★★★★ **easyPrint 1.0, 5F/O, 402/291-0113, $29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

★★★ **Hard Disk ToolKit Personal Edition 1.1.2, FWB 5oftware, 415/474-8055, $79.** The more arcane features of the heavy-duty Hard Disk ToolKit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is included. Jan 93

★★★ **INITPicker 3.0, Inline Design, 203/435-4995, $79.95.** This INIT manager's ability to load aliased INITs over a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

★★★★ **Inline 5ync 1.0, Inline Design, 203/435-4995, $129.95.** Keep the latest version of your work on your portable machine and your desktop Mac with this file-synchronization software. It's easy to install, easy to use, easy on the wallet, and does the job well. Mar 93

★★★★ **KidDesk 1.0, Edmark Corp., 206/556-8484, $39.95.** If you have young children who love to experiment with your Mac while you're busy elsewhere, this desktop environment is a fun way to provide easily navigable play while protecting your files and applications from the havoc that curious little fingers can wreak. Jun 93

★★★★ **Kiwi Power Menus 1.0, Kiwi 5oftware, 805/685-4031, $39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and enabling you to change the font and size in the menus. Dec 92

★★★ **Kiwi Power Windows 1.5 (1.5.2), Kiwi 5oftware, 805/685-4031, $79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. Jul 92

★★★ **MacPalette II 2.2, Microspot U5A, 408/253-2000, $69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, $149.** The consistent, 3-D–style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

★★★★ **Magnet 1.0, No Hands 5oftware, 415/321-7340, $129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

★★★★ **MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, $149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

★★★ **More Disk 5pace 1.1 (1.2), Alysis 5oftware Corp., 415/566-2263, $39.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

★★★ **NightWatch II 2.0.1b, Kent Marsh, 713/522-5625, $159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

★★★★ **Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, $49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac, alerts you when someone does connect, and sets time limits for file share users. Oct 92

★★★ **Norton Essentials for PowerBook 1.0,**

continues



MACWORLD

Star Ratings

Symantec Corp., 310/453-4600, $129. Uneven collection of a dozen PowerBook utilities ranges from the unique and useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which purports to tell you the status of your battery. Apr 93

★★★★ **Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, $149.** Everything-including-the-kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

★★★ **Peace of Mind 1.2.2, Polybus Systems Corp., 716/871-6533, $149.** Hardware diagnostic tool performs exhaustive batch, interactive, and benchmark tests on virtually all major Mac hardware components; does an excellent job of diagnosing simple simulated hardware errors (such as SIMM tweaking). The program has minor bugs and lacks a comparative test-history feature. Jun 93

★★★★ **PicturePress 2.5, Storm Technology, 415/691-6600, $199.** This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

★★★ **PowerMerge 1.0.2, Leader Technologies, 714/757-1787, $129.** File-synchronization utility has a potentially confusing interface, but is a handy means of updating selected files so that different Macs end up with identical versions of the selected documents. Apr 93

★★★ **Public Utilities for the Macintosh 1.0, Fifth Generation Systems, 504/291-7221, $149.** Utility program sticks to the basics of disk diagnosis, disk repair, and file optimization. It does a good, and in some cases unique, job, although disk optimization is slow. The technical support offered by Fifth Generation is excellent. Jun 93

★★★ **RapidTrak 1.0.1, Insignia Solutions, 415/694-7600, $99.95.** If you've got RAM to spare, this hard drive formatter offers driver-level RAM caching to store frequently used data and improve performance, especially on slower-speed drives. May 93

★★★ **Retrieve It 1.0, MVP Software, 415/599-2704, $129.** It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★ **Safe and Sound, Central Point Software, 503/690-8090, $49.95.** Limited but useful disk-protection and -salvage utility has a clean, simple interface and is an efficient emergency recovery tool. Jun 93

★★★★ **Shredder 1.0.1, DLM Software, 619/453-4984, $69.** Permanently blitz your data with this quick and easy trash-management tool that writes over deleted data—in accordance with Department of Defense specifications—so that file-restoration programs can't bring it back. Jul 92

★★★ **Silverlining 5.4, La Cie, 800/999-3919, $149.** Extensive and detailed testing is only one of many advanced functions offered by this hard drive–management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0, Golden Triangle Computers, 619/279-2100, $129.** For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★★ **SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, $70.** Get Info gets faster with this CD-ROM–access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD-ROM folders, this product might save you enough time for it to be worth the $70. Nov 92

★★★★ **Star Trek: The Screen Saver, Berkeley Systems, 510/540-5535, $59.95.** Go where no Mac has gone before with this screen saver based on the original "Star Trek." Modules vary from simple messages in "Trek"-inspired fonts to an endless parade across the ship's main screen of aliens, spacecraft, and artifacts from different episodes. May 93

★★★ **Super 7 Utilities, Atticus Software, 203/324-1142, $99.95.** Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★ **SuperDuper 1.7, NeoConcepts, 408/899-4821, $79.** If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

★★★★ **TimeLog 1.01 (1.02), Coral Research, 702/831-9346, $97.** Even jaded computer users will approve of the reporting options offered by this utility for recording program-usage information. No network features included. Jul 92

★★ **TimesTwo 1.0.1, Golden Triangle Computers, 619/279-2100, $149.** Automatic disk-compression utility operates at the disk-driver level rather than as an operating system add-on. A number of quirks, such as its ungraceful handling of full disks, are problems. May 93

★★★★ **UpDiff 1.0, KyZen Corp., 609/354-3863, $169.** Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. Dec 92

★★★ **Voice Navigator SW 2.3, Articulate Systems, 617/935-5656, $399.** Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★ **WindoWatch 1.52 (1.53), A5D Software, 714/624-2594, $149.** If your main concern is to track program and file use, this utility will handle the job nicely. Using it for time billing with numerous programs, however, may be a maintenance nightmare. Jul 92

★★★ **WonderPrint 1.0, Delta Tao Software, 408/730-9336, $59.** StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

★★ **Workspace 1.0, Ark Interface, 206/654-4127, $149.** This novel desktop replacement is an intriguing first step in improving the Finder, but not enough functionality was added to satisfy our reviewer. Jul 92

★★★ **Zephyr Palettes for PageMaker, Zephyr Palettes for FreeHand 1.0.2 (1.3), Zephyr Design, 206/324-0292, $79.95.** Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modestly priced utilities. A number of details could still be smoothed, but none are real stumbling blocks. Jul 92

VERTICAL MARKETS

★★★ **Compare-A-Loan 4.0.2, Softflair, 612/894-3357, $79.95.** Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Its reports compare payback schedules of various home-loan options. Apr 93

★★ **ConstructionMac 1.2 (2.0), Revelar Software, 801/485-3291, $99.** With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

★★★★ **Diet Balancer 1.0, Nutridata Software Corp., 914/298-1308, $69.95.** Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★★ **Expert Home Design, Expert Software, 305/567-9990, $49.95.** Quickly and easily create home- or office-interior layouts that are precise, but not as detailed as blueprints, with this interior design software that includes a large furniture library. It doesn't do automatic side views, or offer ⌘-*key* access to library objects, but it's a good value nonetheless. May 93

★★ **Expert Landscape Design, Expert Software, 305/567-9990, $49.95.** Bare-bones drawing environment for experimenting with landscape design is inexpensive, but its usefulness is severely limited because of awkward color and pattern tools and because it doesn't identify plant types. Feb 93

★★★★ **Grade Machine 5.0, Misty City Software, 800/795-0049, $79.** Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★ **JobTracker 2.02 (2.5), Info5olutions, 814/355-2983, $395 to $844.** Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92

★★★ **LoanLease Library 3.0.3, Softflair, 612/894-3357, $79.95.** If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★ **Making the Grade 2.0, Jay Klein Productions, 719/591-9815, $99.95.** The Macintosh version of the Apple II program Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn; but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★★ **Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, $79.95.** Gracefully guiding users through the process of drafting a living trust, this product is carefully thought out and a great value for simple trusts. Aug 92

★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, $225.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92

★★★ **Stat-Ref 3.2a, Teton Data Systems, 307/733-9258, $95.** Medical database on CD-ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WRITING TOOLS

★★ **Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, $99.** Illogical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92

★★★ **Correct Letters 1.1 (1.0), Wordstar International, 415/382-8000, $49.** In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online Guide to Letter Writing. The disabled Find command is mystifying and inconvenient. Jul 92

★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, $49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. Sep 92

★★★ **DocuComp II 1.0 (1.03), Advanced Software, 408/733-0745, $179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. Nov 92

★★★★ **EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, $249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, a significant enhancement to an excellent product. Sep 92

★★★★ **Final Draft 2.0, MacToolkit, 310/395-4242, $349.** Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script, including dialogue, action, and slug lines (scene headings). Customization is easy, and macros automate typing of common phrases such as "fade to black." Apr 93

★★★ **IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, $595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. Jan 93

★★★ **Just Joking 1.0, WordStar International, 415/382-8000, $49.** HyperCard stack of around 2800 humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **Microsoft Word 5.1, Microsoft, 206/882-8080, $495.** Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it won't give Word 5.0 users goosebumps. Mar 93

★★ **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, $150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92

★★★ **Plots Unlimited 1.04, Ashleywilde, 310/456-1277, $399.** Peter loves Allison but she has a breakdown when he confesses to murder. Or maybe not. This writing tool's database contains 5600 plot twists, all linked. The interface is imperfect, leaving items in bold when they should be grayed out, and it requires too much mousing. Jul 92

★★★ **RightWriter for the Mac 5.0, Que Software, 317/573-2500, $99.95.** Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable writing-style filters and multiple approaches to analysis are nice, but—as with all grammar checkers—not all of the program's advice is great. May 93

★★★ **ShowScape 4.1, Lake Compuframes, 914/941-1998, $429, with WordPerfect 2.0 $679.** This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★ **StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, $345.** Frustrating and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. Aug 92

★★★ **Thunder 7 1.0.5 (1.5), Baseline Publishing, 901/682-9676, $99.95.** The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity. Jul 92

★★★ **TypeReader 1.0, ExperVision, 408/428-9988, $695.** Speed and accuracy combine with a straightforward operating style in this high-end optical character-recognition software that doesn't do everything its competition does, but is a major contender nonetheless. Feb 93

★★★ **VersionMaster 1.5, AStar Technologies, 508/486-8532, $199.95, five users $799.95, ten users $1199.95.** Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It's recommended only for workgroups that routinely follow check-out procedures and that don't need detailed reports of the changes to a file. Apr 93

★★★ **WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, $495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★ **WordScan, WordScan Plus 1.0 (1.01), Calera Recognition Systems, 408/720-8300, $295, $595.** The idiosyncratic interface of these two OCR programs is only a minor inconvenience considering their relative accuracy and speed. Jun 92

★★★★ **WriteNow 3.0, WordStar International, 415/382-8000, $249.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

Hardware

INPUT DEVICES

★★★ **A³ Mouse, Mouse Systems Corp., 510/656-1117, $134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. Jun 92

★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, $149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

★★★★ **The Bat, Infogrip, 504/766-8082, $495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. Oct 92

★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, $645, $395.** Two likable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Jul 92

★★★ **Mouse-Trak, Itac Systems, 214/494-3073, $179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

★★★ **MouseMan, Logitech, 510/795-8500, $129.** Bear-paw–shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

★★★ **TrackMan, Logitech, 510/795-8500, $149.** There's a right-hand bias to this trackball with three programmable buttons and a handy click-lock feature. Jun 92

★★★★ **Turbo Mouse 4.0, Kensington Microware, 415/572-2700, $169.95.** Large buttons on either side of this trackball provide just the right measure of tactile feedback; the removable ball glides freely. But the breakthrough feature is the software that lets you customize many of the trackball's functions. Nov 92

★★★ **The UnMouse, MicroTouch Systems, 508/694-9900, $199.** Input device is a cursor-control device, programmable keypad, and small graphics tablet in one, and can be programmed with 60 macros (although only 16 can be selected by sight). It's ergonomically better than a mouse, but not as good as a trackball. May 93

★★★ **Voice Express, MacSema, 503/757-1520, $399.** Voice-recognition board lets you record words or phrases that trigger simple key sequences, but commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features. Apr 92

★★★ **Voice Navigator II, Articulate Systems,**

continues



MACWORLD

Star Ratings

617/935-5656, $699. Stand-alone SCSI device has an impressive, full-featured set of tools for voice control of your Mac, but mastering them takes time and effort. Apr 92

★★★ **Z-Nix Cordless SuperMouse, Z-Nix, 714/629-8050, $99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). Dec 92

MISCELLANEOUS HARDWARE

★★★ **ACS300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, $400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. Nov 92

★★★★ **AppleCD 300, Apple Computer, 408/996-1010, $599.** Double-speed CD-ROM drive spins its discs at twice the speed of earlier drives, providing faster access to large files. It also reads multisession Photo CDs. Jun 93

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, $329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. Jun 92

★★★ **MacSpeaker MS-1, Monster Cable, 415/871-6000, $229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

★★★★ **Media Control Station, JLCooper Electronics, 310/306-4131, $269.95.** This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data. Feb 93

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, $499.95.** Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. Oct 92

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, $34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, $129.99.** If you own a 5000-, 7000-, or 8000- series Sharp Wizard, this program and cable allow you to connect it to a Mac serial port to exchange data. It's functional, but does have some minor weaknesses. Jan 93

★★★ **PhonePro 1.0.3 (1.1), Cypress Research Corp., 408/752-2700, $950.** Application makes it relatively easy to develop a multiple-choice voice-mail system using your Mac, especially for those with programming backgrounds. The product includes a 9600-bps modem and a headset/microphone. Feb 93

★★★★ **PowerKey 2.0, Sophisticated Circuits, 206/485-7979, $119.** Ingenious, well-designed automated power strip has four surge-protected outlets controlled by the keyboard's on/off switch. The clever software can turn on a Mac, unattended, run a QuicKeys macro (QuicKeys Lite included), and shut down again. Dec 92

★★★ **Yamaha TG100, Yamaha Corp. of America, 714/522-9011, $449.** Compact, keyboardless, multitimbral MIDI synthesizer with built-in MIDI interface adheres to the life-simplifying General MIDI standard patch arrangement. Although it won't convince you that you're hearing a live orchestra, the sound is about as realistic as low-cost MIDI gets. Apr 93

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, $399.** Unusually well designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. Jun 92

★★★ **Comstation 4, PSI Integration, 408/559-8544, $499.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. Jun 92

★★ **EtherPrint, Dayna Communications, 801/531-0600, $499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. Dec 92

★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, $649.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, $695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

★★★★ **PathFinder, Dayna Communications, 801/531-0600, $899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

★★★ **PowerModem, PSI Integration, 408/559-8544, $299.** Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, $499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. Dec 92

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, $599.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than average. Feb 93

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, $399.95.** Send and receive faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, $649.** When it can reliably transmit data at high speeds and the bugs are fixed, this fax modem with voice mail will be worth a second look. Oct 92

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, $469.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, $475.** Only slighter larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatibles. Jan 93

PRINTERS

★★ **C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, $2395.** Not only is this laser printer more expensive than most personal page printers, it also offers less-impressive features and so-so output. Nov 92

★★★★ **DEClaser 1152, Digital Equipment Corp., 508/493-5111, $1299.** Four-pages-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Macs and PCs, plus excellent image quality, for a ground-breaking price. The internal font set is small, and the included 2MB of memory is not enough to print complex images. May 93

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, $2999.** An Intel i8960 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. Feb 93

★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, $3495.** The output of this color ink-jet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. Oct 92

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, $3995.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under $4000. Aug 92

★★★ **LaserWriter Pro 600 and 630, Apple Computer, 408/996-1010, 600 $2099, 630 $2529.** From their paper handling to their print quality, these laser printers are Apple's best printers, as well as the best printers available in their price range. Unfortunately, they don't support emulation-sensing, and thus may be less desirable for mixed-platform offices than other possibilities. Jun 93

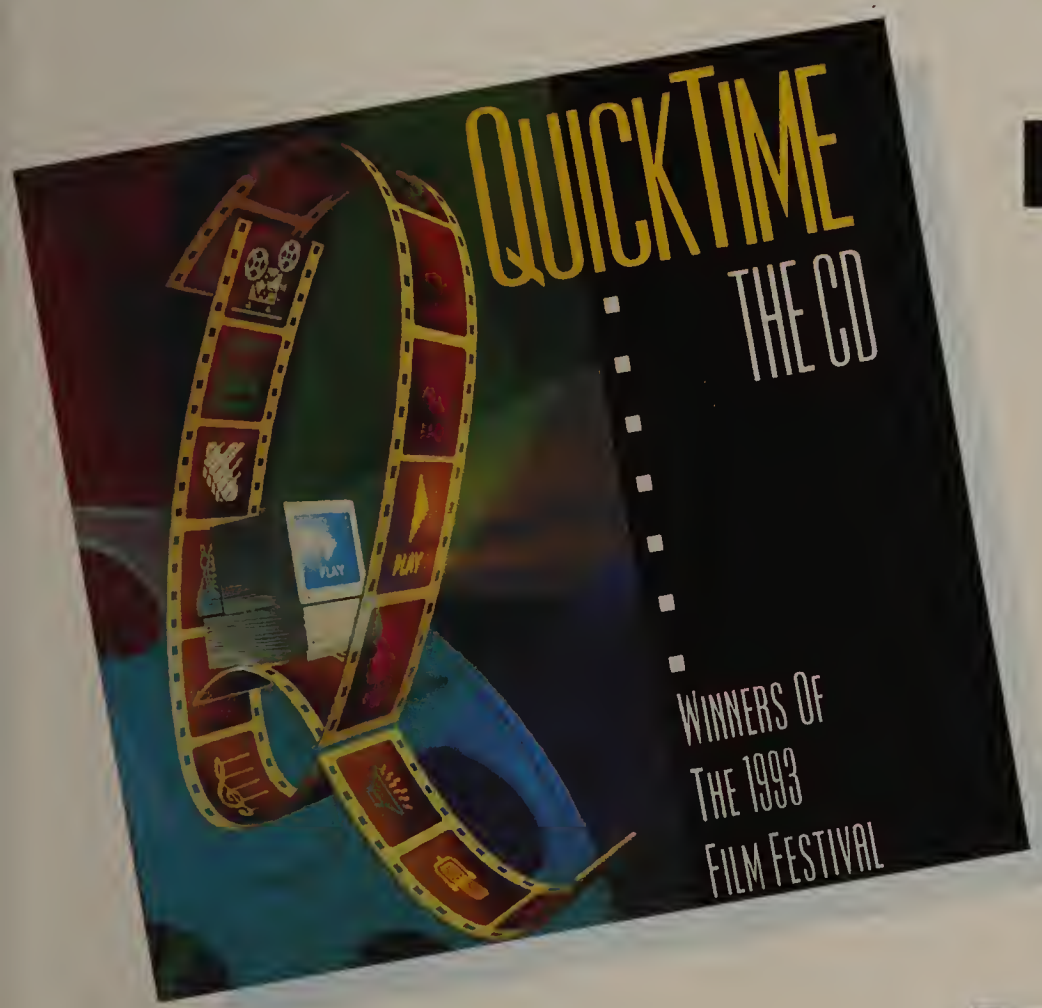
★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, $3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. Sep 92

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, $2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. Jul 92

★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, $8999.** The cost of high-qual-

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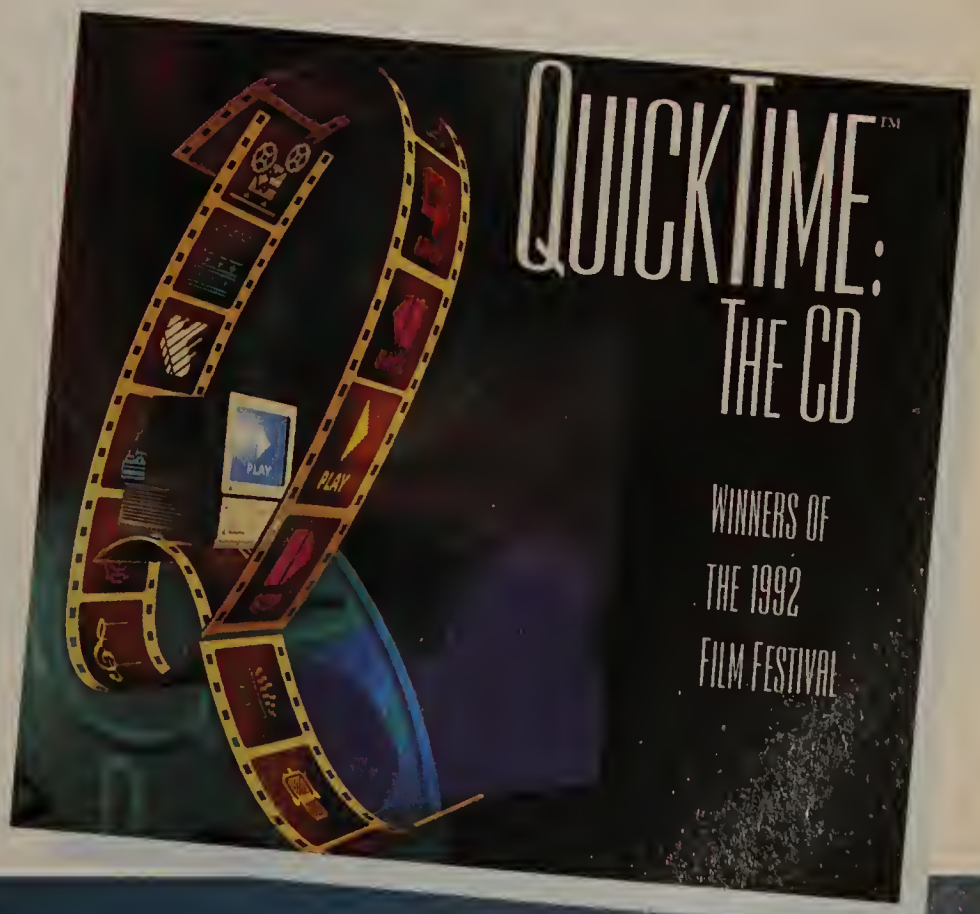
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ity, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. Oct 92

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, $3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. Sep 92

★★★★ **StyleWriter II, Apple Computer, 408/996-1010, $359.** Apple's ink-jet printer retains the best features of its predecessor, but costs less. New features, such as gray-scale printing and the ability to share the printer over a network, make it even more versatile. Jun 93

★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, $2349.** An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra $500 is worth it. Jul 92

★★★ **WideWriter, GCC Technologies, 617/890-0880, $1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. Feb 93

★★★ **WriteMove II, GCC Technologies, 617/275-5800, $599.** Portable printer for the PowerBook measures 11½ by 2 by 3½ inches and weighs 2½ pounds. It's no speed demon, but it's fine for short jobs. May 93

SCANNERS

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, $1095.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around $750. Muddled online help and a flimsy hinge are minor problems. Aug 92

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, $649.** Well-executed hand-held gray-scale scanner creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. Jun 92

★★★★ **Mirror 600 Color Scanner, Mirror Technologies, 612/633-4450, $1199.** Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. Apr 92

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit $9535, 24-bit $11,316.** The bread-box–style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. Sep 92

★★ **PageBrush Professional, Mitsubishi International, 415/544-2781, $795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. Jun 92

★★★ **RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, $849.** Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. Apr 92

SYSTEMS/STORAGE

★★★ **Duo Dock, Apple Computer, 408/996-1010, $1079.** Immensely clever desktop-Mac–size housing for the Duo laptops provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of installing NuBus boards, belie Apple's usual attention to detail. Mar 93

★★★★ **FastCache Quadra, Daystar Digital, 404/967-2077, Quadra 950/900/700 version $449, Quadra 900/700 version $299.** PDS board provides 128K of secondary cache for a Quadra with 15ns static RAM (25ns on 900/700). The average real-world speed improvement is 15 percent, but some operations benefit more from the cache card than others. May 93

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, $585.** It is easy to recommend this floptical drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. Sep 92

★★★ **Freedom 120, Maxen, 619/944-0818, $699.** Battery-powered hard drive provides three to four hours of hard drive storage without a power cable; it performs at a respectable speed, but lacks a battery-power gauge and automatic sleep mode. The skimpy manual is the most serious problem. Sep 92

★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, $599.** The good points of this floptical drive include extensive documentation, switchable termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. Sep 92

★★★ **Infinity Optical 3.5, Peripheral Land, 510/657-2211, $1999.** If you need the extra measure of permanence that magneto-optical storage provides—or you want a compact alternative to bulky cartridges—this drive, based on a Sony mechanism and using 3½ -inch disks that store 120MB of data, deserves a look. Jun 93

★★★ **Macintosh Centris 610, Apple Computer, 408/996-1010, 4/80 $1859.** Slim-design Mac uses a 20MHz 68LC040 processor at a price-to-performance ratio that comes close to competing with low-price Windows PCs; however, its expandability is severely limited. Jun 93

★★★★ **Macintosh Centris 650, Apple Computer, 408/996-1010, 4/80 68LC040 $2699.** Moderately priced but fast 040 system offers three expansion slots and one drive bay, and (except for the base model) has built-in Ethernet, video circuitry, and a math coprocessor. This desktop Mac is as powerful as a Quadra 700 and two times as fast as a IIci. Jun 93

★★★ **MicroMac Plus Upgrade System, MicroMac, 714/362-1000, $998.** This 68030 accelerator for the Mac Plus requires disassembling a Plus and using the Plus system board to assemble the MicroMac system. It speeds up the Plus dramatically, and supports an included external full-page monochrome monitor. Jun 93

★★★★ **MultiDisk 150, Iomega, 801/778-**

1000, $1225. Durable cartridges are one of the strongest reasons to choose this Bernoulli removable drive. Although the drive is slightly more expensive than a SyQuest drive, it's fast and reliable, and the disks are competitively priced. Jun 93

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, $2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. Oct 92

★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, $6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. Jan 93

★★★ **PowerBook 145, Apple Computer, 408/996-1010, $2149 to $2499.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

★★★★ **PowerBook 160, Apple Computer, 408/996-1010, $2429 to $3149.** A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. Feb 93

★★★★ **PowerBook 180, Apple Computer, 408/996-1010, $4109 to $4469.** An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra $1000. Feb 93

★★★★ **PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) $2249, 230 (4/80) $2609.** Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackmarble") feel small, these computers virtually cry out to be picked up, handled, and used. Mar 93

★★★ **QuadFlextra, Quadram, 404/923-6666, $495.** Remarkable super-high-density floppy drive uses an ingenious disk-formatting method to put just over 20MB on a single 3½-inch floppy disk, but it may not be as cost-efficient as other options. Apr 92

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis $469, 240MB drive $979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive solves the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

★★★★ **Radius Rocket 33, Radius, 408/434-1010, $2499.** The accelerator board of choice for our reviewer, this 68040, 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROM), IIx, IIcx, or IIci. Oct 92

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, $2995.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. Oct 92

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, $1399 (includes 6MB of RAM).** This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

★★★ **Canon ESP, Canon USA, 516/328-5970, $4500.** No-nonsense package enables you to shoot still-video pictures, digitize the video into a Mac for touch-up, and record the modified shots back to the camera for playback through any television set. It's good for presenters who need to incorporate photographs, but it is quite expensive. Apr 93

★★★ **Canon RC250, Canon USA, 714/753-4320, $799.** An adequate choice for users looking for an inexpensive still-video system. Camera captures up to 50 color images per video floppy disk and hooks up to any television. Jun 92

★★ **Dycam Model 1, Dycam, 818/998-8008, $895.** Compact, point-and-shoot, still-video camera records and downloads images in 8-bit gray-scale—as long as the battery doesn't die first. Jun 92

★★★ **L-TV, Lapis Technologies, 510/748-1600, $349.** Interface board allows a Mac LC, LC II, or Performa to use a standard television monitor as a display device. Unfortunately, a standard television is a poor substitute for a color monitor, so while the L-TV does its job adequately, the setup is unsuitable for many applications. May 93

★★★ **Lightning Effects II, Spectral Innovations, 408/955-0366, $1295.** Digital-signal-processor chips dramatically speed up some Photoshop operations with this expensive Photoshop-acceleration board. It had problems acquiring some JPEG files. May 93

★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, $1599.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. Jun 92

★★★ **Power Portrait, Sigma Designs, 510/770-0100, $899 or $949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, with no RAM $499, with 2MB of RAM $699, with 4MB of RAM $999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. Feb 93

★★★★ **ThunderStorm, SuperMac Technology, 408/245-2202, $999.** Photoshop-acceleration board uses digital-signal-processor chips to speed up some Photoshop operations. It's fast, with good JPEG compatibility and a great manual. May 93

★★★★ **VideoSpigot, SuperMac Technology, 408/245-2202, $499 to $1599.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92 m

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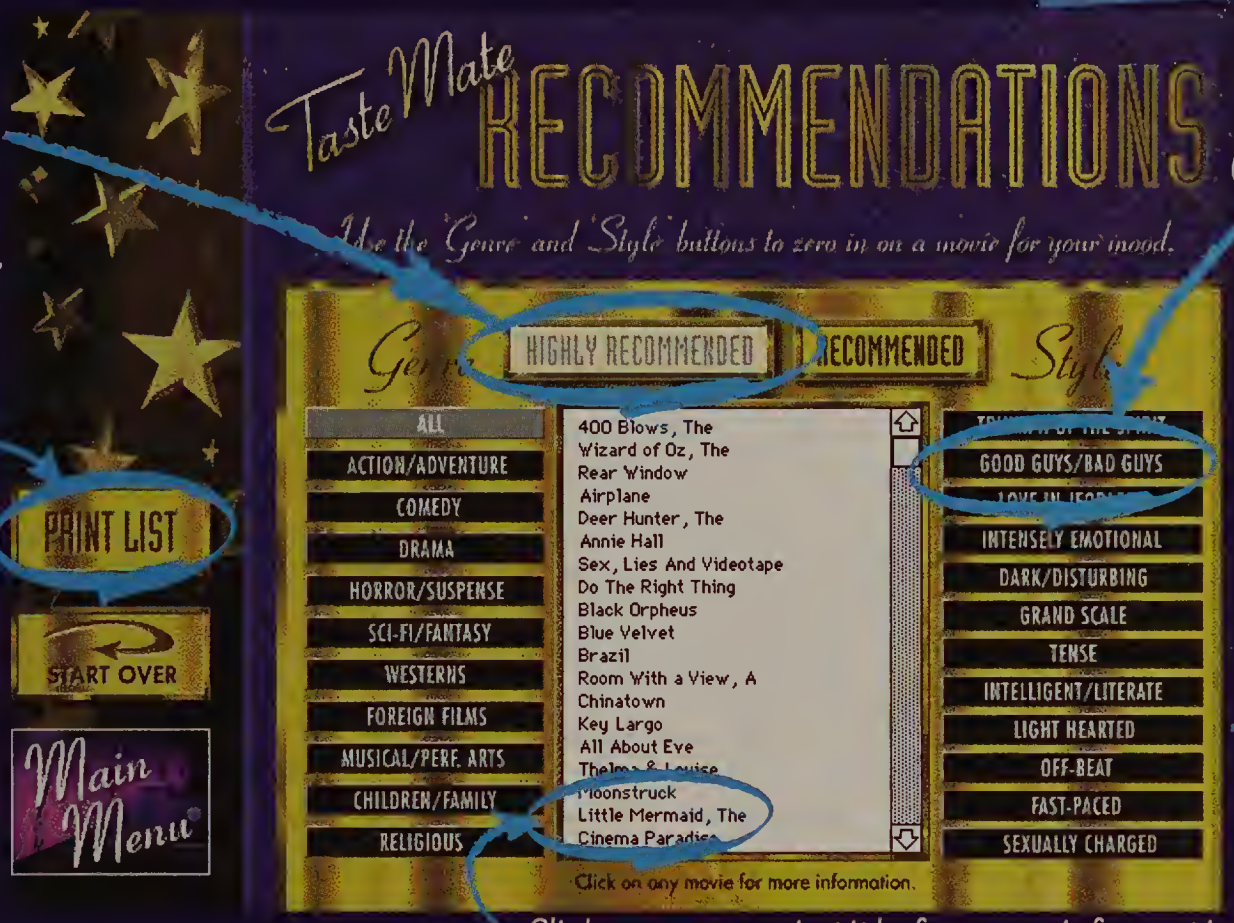
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309	O.C.E.A.N. Microsystems	94	800/944-8439
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72	PCPC	116	800/662-2888
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139	Radius	—	800/227-2795
151	Radius	—	800/227-2795
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Capacity	Size	Access	Internal	External
800k	3.5"	Ext. Floppy Drive		70
520mb	3.5"	9ms	775	835
1.2gig	3.5"	8.5ms	1579	1609
2.4gig	5.25"	11.5ms	2039	2139

Seagate — One/Five Year Warranty

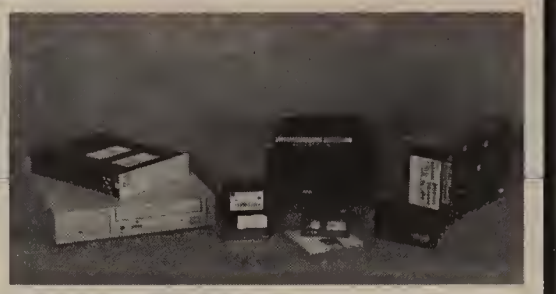
Capacity	Size	Access	Internal	External
283mb	3.5"	16ms	374	434
600mb	3.5"	10.5ms	949	999
1.2gig	3.5"	9ms	1299	1359
2.4gig	5.25"	11ms	2499	2599
3.4gig	5.25"	10ms	3399	3499

Toshiba — Two Year Warranty

Capacity	Size	Access	Internal	External
213mb	2.5"	12ms	599	699
877mb	3.5"	12.5ms	1039	1099
1.0gig	3.5"	12ms	1349	1409

Hitachi — Five Year Warranty

Capacity	Size	Access	Internal	External
1.2gig	3.5"	11.8ms	1129	1189
1.6gig	3.5"	11.8ms	1499	1559
3.7gig	5.25"	12.8ms	3299	3399



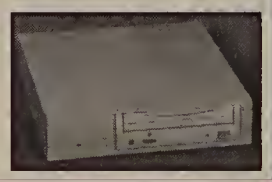
Optical Drives — One Year Warranty

All Drives include one Cartridge

Capacity	Model	Access	Ext
128mb	Ricoh	30ms	999
128mb	Fujitsu	30ms	929
600mb	Ricoh Hyperspace	28ms	1999
1.0gig	Panasonic	90ms	3039

CD ROMS

Toshiba 3401 558
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Tape Backup Systems — Backups include Tape

Capacity	Model	Media	Int	Ext
250mb	Archive Viper	DL6250	459	499
500mb	Archive Viper	DL6250	659	699
1.3 - 2gig	Archive 4320	4mm	1109	1149
1.3 - 8gig	ArchiveTurbo	4mm	1299	1359
1.3 - 4gig	Exabyte 4200	4mm		1459
1.3 - 5gig	Exabyte 8205	8mm		1659
1.3 - 10gig	Exabyte 8505	8mm		2379

Scanners

Ricoh IS60 2400 dpi. One pass flatbed Scanner. 256 shades of gray. 8.5" x 14" — 999

Panasonic RS307U 600dpi One pass Scanner. Flatbed 256 shades of gray. 8.5" x 14" — 930

Media

60m	Tape	16	128mb Optical		35
90m	Tape	18	600mb Optical		165
112m	Tape	18	250mb Vipor		35

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Watch NATURE every Sunday on PBS, and save nature by joining The Nature Conservancy. Call us at 1-800-628-6860. Future generations—our wildlife's and our own—depend upon the values we instill and support today.

NATURE

The Nature Conservancy

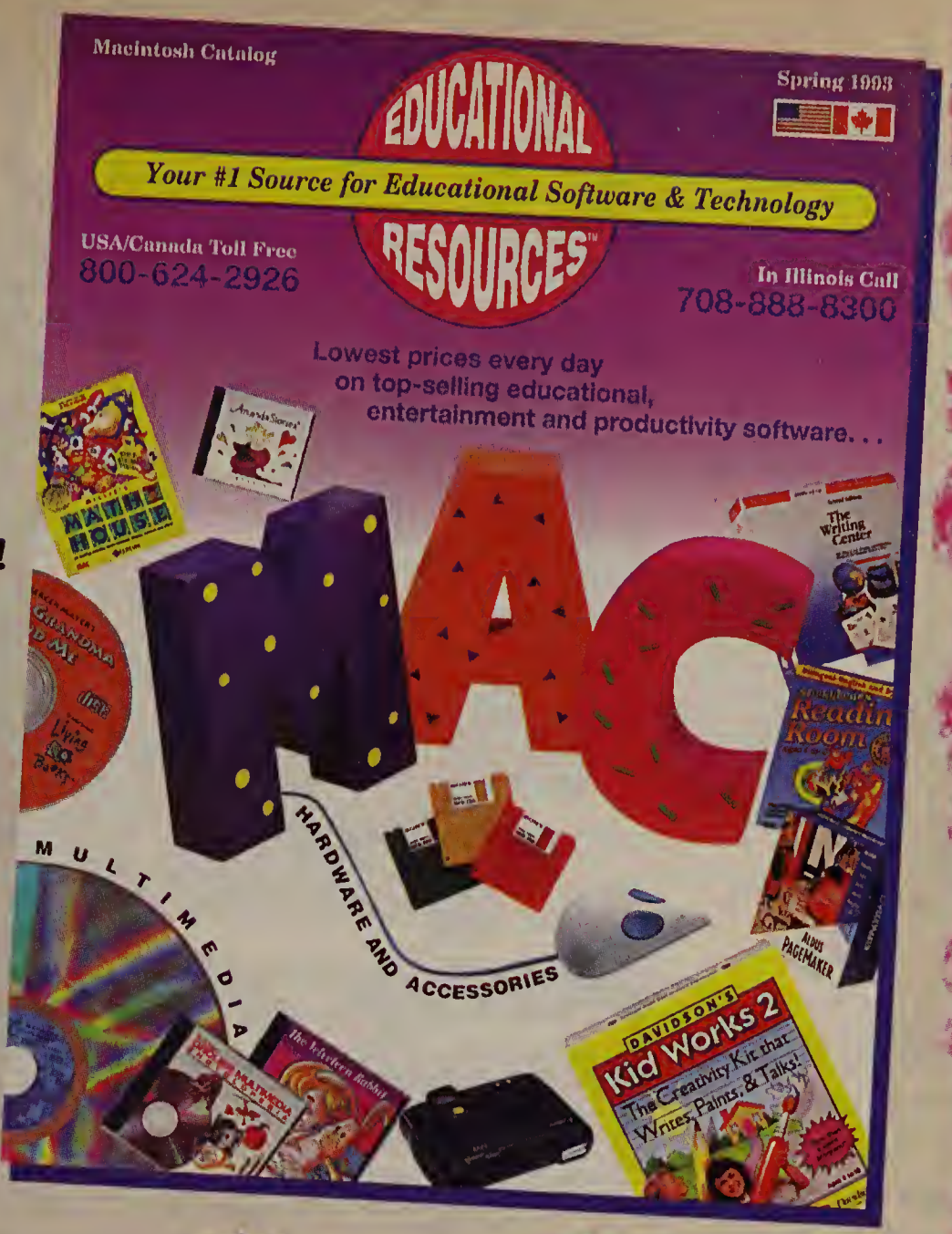
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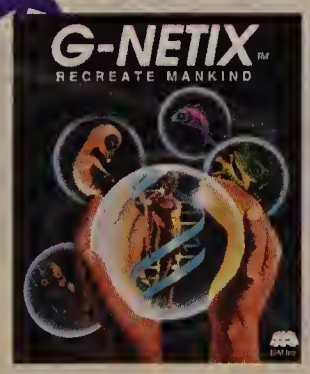
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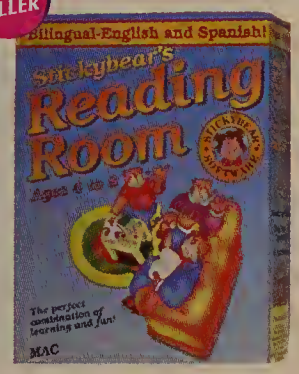
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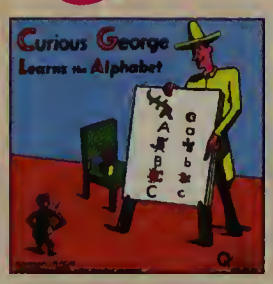
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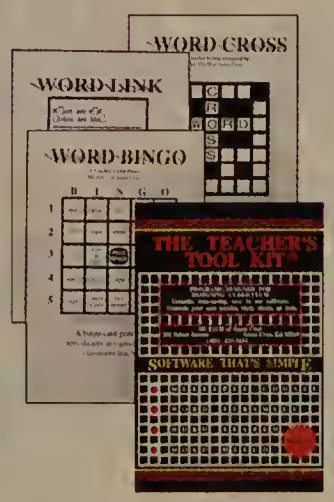


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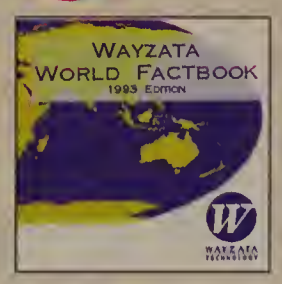


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A. Radius 21" Color	$3,069	Hitachi					■		■
NEC 21" 6FG Color	2,699	NEC	■		■	■	■	■	
SuperMac 21" Mono/Grayscale	989	—					■		■
B. SuperMac 20" (SuperMatch)	$1,499	Hitachi				■			■
C. **NEW!** RasterOps 20" Trinitron Multi-Mode	2,359	Trinitron	■		■	■	■	■	■
D. RealTech 20" Trinitron Multi-Mode	1,895	Trinitron	■		■	■	■	■	■
***NEW!** Radius IntelliColor 20"*	2,759	Trinitron	■		■	■	■	■	■
RasterOps 20" Hitachi Color	1,329	Hitachi	■		■	■		■	■
* **NEW!** SuperMatch 20•T Multi-Mode XL	2,699	Trinitron				■	■		■
E-Machines 19" Color (T19 II)	2,399	Trinitron				■	■	■	■
E. Mitsubishi 17" Diamond Pro	$1,199	Trinitron	■		■	■	■	■	■
F. NEC 17" 5FG Color	1,539	NEC	■		■	■	■	■	
G. Sony 17"	1,149	Trinitron	■		■	■		■	■
H. RealTech 17" Multi-Mode	995	Hitachi	■		■	■		■	■
I. Seiko Instruments 17" CM1760LR	1,249	Trinitron	■		■	■		■	■
J. RasterOps 16" (RasterOps Sweet 16)	$1,199	Panasonic			■				■
* E-Machines 16" Color (ColorPage T16)	1,299	Trinitron	■		■	■		■	■
K. NEC 15" 4FG Color	899	NEC	■		■	■		■	
L. Radius 15" Precision Color Pivot	$959	Non-Trinitron	■	■	■	■		■	■
M. Sigma 15" Grayscale (PageView GS)	579	Phillips		■					■
N. RealTech 15" Grayscale	449	—		■					■
Sigma 15" Grayscale (Power Portrait)	659	Phillips		■					■
NEC 15" 3FGX Color	699	NEC	■		■	■		■	
O. Seiko Instruments 14" Color (CM1445)	$499	Trinitron	■						■
P. Sony 13" Color	689	Trinitron	■						■

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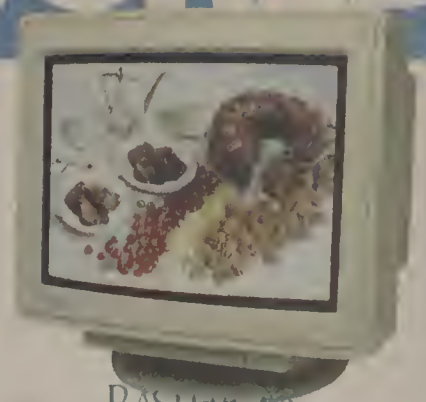
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M SIGMA DESIGNS

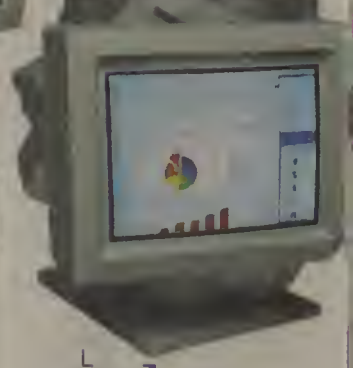
Don't know which card is compatible with your CPU & monitor? Call us toll-free.

	Price	Maximum resolution	Accelerated
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8XL	*469*	1152 x 870	
PaintBoard Li (24)	*829*	1024 x 768	■
*24STV**	*779*	640 x 480	■
*MediaTime**	*1,549*	640 x 480	
SUPERMAC			
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Spectrum/8 NuBus	*419*	1024 x 768	
Spectrum/8 LC II, IIsi	*499*	1152 x 870	
Spectrum/24 Series IV	*829*	1024 x 768	■
Spectrum/8•24 PDQ	*829*	640 x 480	
Spectrum/8•24	*579*	640 x 480	
Thunder 24	*2159*	1152 x 870	■
ThunderLight	*1669*	1152 x 870	■
*Video Spigot**	*369*	160 x 120	
*Video Spigot & Sound**	*479*	160 x 120	
RADIUS			
Precision Color 24X	*$1,649*	1152 x 882	■
Precision Color 8XJ	*499*	1152 x 882	■
Precision Color 24XK	*829*	1024 x 768	■
Precision Color 24XP	*499*	832 x 624	■
*Video Vision**	*1,979*	640 x 480	
E-MACHINES			
ColorLink DC/T (8-bit with Ethernet)	*519*	1024 x 768	■
ColorLink SX/2 (24-bit with Ethernet)	*649*	1024 x 768	■
Futura SX24	*499*	1024 x 768	■
DoubleColor LX (8)	*699*	1152 x 870	■

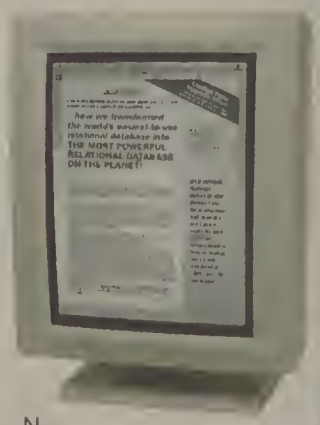
*24-bit; captures up to 30 frames per second



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monitors!

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Real Tech™

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- *Quadra-ready*



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HARDWARE THAT FITS



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MICROTEK

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Real Tech™

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REALTECH								
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Optional Adobe Photoshop	*200*							
Scan 800 with Transparency Option	*1,595*	800	200	8.5 x 11.75	■	■	■	
UMAX								
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Transparency Option	*729*	(600)	(51)	6 x 9	■	■	■	
UC 840	*1,329*	800	51	8.5 x 14	■			*Includes full version of Adobe Photoshop*
Transparency Option	*729*	(800)	(51)	6 x 9	■	■	■	

Color printers

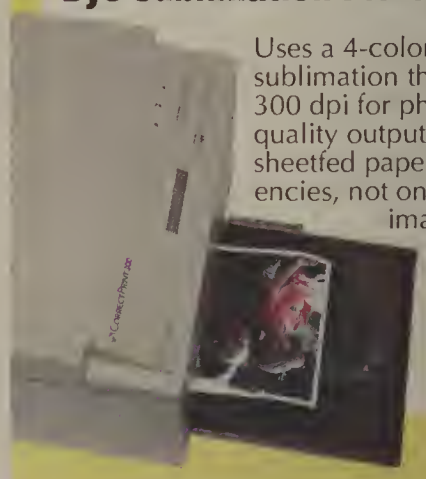
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SII

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Real Tech™

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- 17
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- 35
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- 35

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- PostScript compatible
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- Optional 2nd paper drawer

- SCSI port
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- 35
NewGen's proprietary Image Enhancement Technology

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- 8 ppm (letter size); 4.6 ppm (tabloid size)
- 12 MB RAM (expandable to 32 MB)

- Adobe PostScript compatible
- Intel 80960CA RISC processor

- 10,000 pages per month
- Optional 2nd paper cassette

- SCSI port
- Optional Ethernet
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- 39



TI MicroLaser Plus

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SupraFax 144 PB *299*
SupraFax 144 PB Plus *399*

MassMicro FM 24/96 Network *359*
MassMicro FM 24/96 Personal *165*

Global Village PowerPort–*Gold* *399*
Global Village PowerPort–*Silver* *339*
Global Village PowerPort–*Bronze* *189*

Networking products

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Asanté 10T Hub/8 (Ethernet concentrator)

Lets you use inexpensive unshielded twisted-pair (UTP) telephone wire instead of expensive coaxial cable for local area networks.

10Base–T Hub/8 ..... *$255*

Asanté EN/SC (SCSI-to-Ethernet adapter). For Macs without available slots.

EN/SC *$329*

Asanté MacCon 3 Ethernet card. Automatically configures to media used.

MacCon 3 Card *$209*

DaynaPORT E/II-T NuBus Card

Connects Mac II computers to thick, thin, fiber optic or 10Base-T Ethernet cable systems.

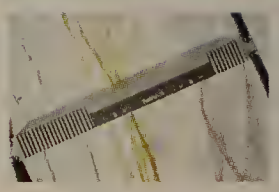
Includes an RJ-45 jack for 10Base-T wiring.

DaynaPORT E/II-T NuBus Card *$149*

DaynaPort E/Z. Ideal for Macs that don't have a slot for a network interface card.

DaynaPORT E/Z *$269*

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NetBridge *589*
EtherGate Router *1239*
NetSerial *269*
NetModem/E *1409*
NetModem v.32 (for LocalTalk) *989*
Hublet *199*
LanRover/L *579*
LanRover/E (4-port) *1659*
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Lease: $95/month

Macintosh IIvx Business Solution
Macintosh IIvx, 5 MB of RAM, 245 MB Maxtor hard drive, SuperMac 21" Platinum monitor w/video card, cache card, and Key Tronic MacPro Plus extended keyboard.



$6,979

Lease: $191/month

Quadra 800/Trinitron Intermediate Graphics Solution *Quadra 800, 8 MB of RAM, 230 MB hard drive, RealTech 20" Trinitron monitor w/RasterOps PaintBoard Li and Key Tronic MacPro Plus extended keyboard.*



$9,445

Lease: $259/month

Quadra 950/ Trinitron High-end Graphics Solution
Quadra 950, 8 MB of RAM, 520 MB Micropolis hard drive, RasterOps 20" Trinitron monitor w/RasterOps PaintBoard Li and Key Tronic MacPro Plus extended keyboard.

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PowerBook Duo 210 8/80 ..... $2499
PowerBook Duo 230 8/80 2859
PowerBook 160 8/40 2679
PowerBook 165c 4/80 3399
PowerBook 180 8/80 4359

POWERBOOK PORTABLE DOCKS

PowerLink Presentor (8-bit) $469
Designed for presentations. Connects the PB Duo to almost any type of video screen. The ideal travel dock.

PowerLink DeskNet (8-bit) 659
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Centris 610, 4 MB of RAM, 80 MB hard drive, Seiko Instruments 14" Color CM1445 monitor, and Key Tronic MacPro Plus extended keyboard $2415

Centris 610, 8 MB of RAM, 80 MB hard drive, RealTech 17" color monitor, built-in Ethernet and Key Tronic MacPro Plus extended keyboard $3179

CENTRIS 650 SYSTEMS

Centris 650, 8 MB of RAM, 80 MB hard drive, Sony 17" Color monitor, and Key Tronic MacPro Plus extended keyboard $4075

Centris 650, 8 MB of RAM, 230 MB hard drive, 20" Real Tech Trinitron monitor, RasterOps Paintboard Li, built-in Ethernet and FPU, and Key Tronic MacPro Plus extended keyboard $6229

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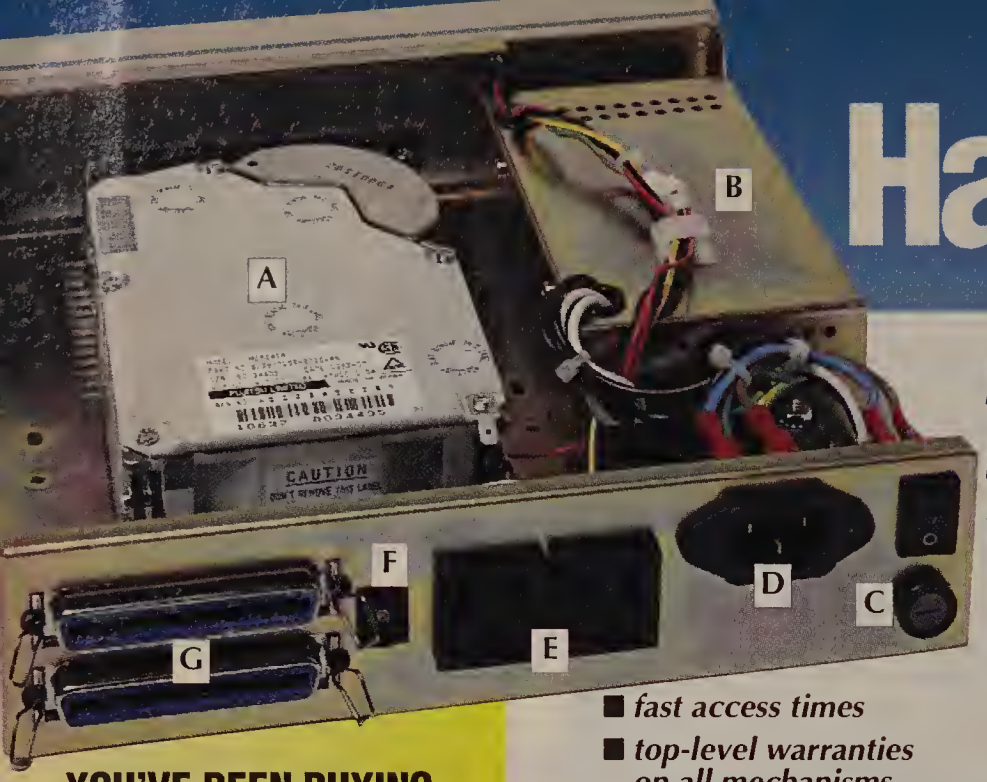
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- *top-level warranties on all mechanisms*
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A. *We use the highest quality name-brand mechanisms available; fully tested and burned in*

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C. *External fuse keeps fuse replacement simple*

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E. *2 switched outlets provide power to additional peripherals, allowing 1-step system power-up*

F. *Easy-to-use pushbutton SCSI I.D. selector switch*

G. *Two 50-pin SCSI connectors for simple configuration*

Premium double-shielded 26-inch Mac-to-SCSI cable (not shown) prevents electronic interference. Thermally-engineered ventilation maintains optimum airflow, cools internal mechanisms; quiet cooling fan. Universal power supply (90-260 volts).

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During the past eight years, we've become America's one-stop source for Macintosh solutions. Now we can be your one-stop source for storage solutions, too. Because we're the company you can trust to give you the very best...

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- **SERVICE**
- **VALUE**

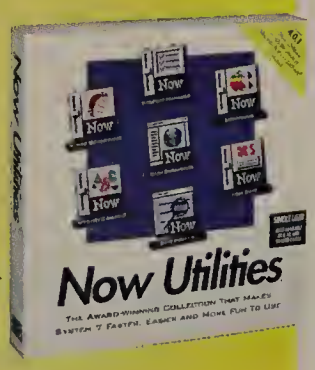
Stack up our drives against the "best of the best" and they'll come out on top. You can trust us to always bring you the highest-quality Mac hardware!

Need a really big drive, with a LOT of storage capacity? These drives offer big performance.

Model number	Internal price	External price	Formatted Mac capacity (in MB)	Average access time (in ms)	Transfer rate* (in Mb/second)	Form factor**	Warranty (years)
1.2 - 3.6 GB							
Fujitsu 1.2	M2266	*$1249*	*$1349*	1079	14.5	3.0[1]	FH	5
HP 1.2	C2247	*1589*	*1659*	1000	10.5	5.3[1]	HH	5
Micropolis 1.2	M2112	*1449*	*1519*	1005	10	5.0[1]	HH	5
Quantum 1.2	PRO1225	*1599*	*1669*	1200	10	2.9[1]	HH	2
Toshiba 1.2	MK-538FB	*1399*	*1469*	1200	12.5	4.0[1]	HH	3
Maxtor 1.2	MXT-1240	*1549*	*1619*	1240	9	4.5[1]	HH	3
Conner 1.3	CP-31370	*2059*	*2129*	1030	10.5	6.0[1]	HH	1
Micropolis 1.5	M1528	*2299*	*2399*	1341	14.5	2.9[1]	FH	5
Micropolis 1.6	M1548	*2379*	*2479*	1748	14	4.8[1]	FH	5
Fujitsu 2.0	M2652	*$2299*	*$2399*	1752	11	4.8[2]	FH	5
Seagate 2.1	ST42100N	*1999*	*2099*	1900	12.9	3.9[2]	FH	5
Fujitsu 2.4	M2654	*2549*	*2649*	2000	11	4.8[2]	FH	5
Micropolis 2.4	M1924	*2649*	*2749*	2100	11.5	4.5[2]	FH	5
Seagate 2.4	ST42400N	*2879*	*2979*	2050	11s	4.5[2]	FH	5
HP 2.4	C3010	*2899*	*2999*	2000	11.5	5.3[2]	FH	5
Seagate 3.4	ST43400N	*$3999*	*$4099*	2750	11	6.0[2]	FH	5
Micropolis 3.6	M1936	*4199*	*4299*	3022	12	6.0[2]	FH	5

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. ***Form Factor Low Profile (LP)=3.5 Half Height (HH)=3.5 Full Height (FH)=5.25*

[1] SCSI-2 [2] SCSI-2 Fast ***These drives are most efficient when used with a Macintosh Quadra 800, 950 or a RealTech SCSI-2 card.***



Limited time offer!

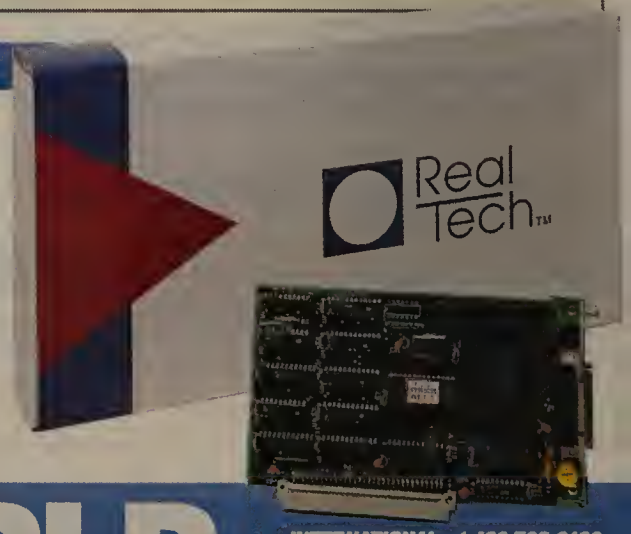
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Includes 7 powerful utilities: Startup Manager, Super Boomerang, WYSIWYG Menus, Now Profile, Now Scrapbook, Now Save, Now Menus. Use Now Utilities to maximize System 7's capabilities, and to simplify using your Mac.

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Allows all NuBus Macs to communicate with newer, high-performance hard drives at substantially faster transfer rates.

Sustained transfer rate of up to 4.4 MB per second, plus a burst transfer rate of 6 MB per second (6/10 on a Quadra). Mirroring capabilities. *$299*



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Drive w/Diskette 5-pack *1229*

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Includes Retrospect 2.0 backup software.

TEAC 155 MB Drive *$499*
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REALTECH DAT

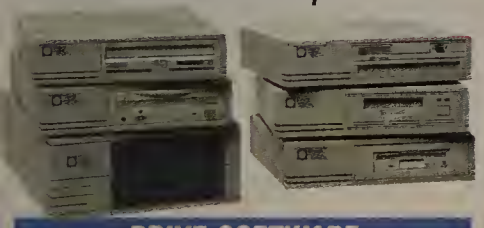
DDS-DC Drive (2-8 GB capacity;
1 yr. warranty; includes Retrospect
2.0 backup software) *$1399*

The RealTech DAT Drive uses industry-standard DDS-DC compression on a 90-meter tape. Depending on your data, storage capacities may vary from 2 to 8 GB.

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88c MB Drive *599*

**Includes one disk or tape*



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Software is included with your drive. Disk partitioning; password protection; diagnostic testing; multiple SCSI-bus support; extensive on-line help; and more. Also included with your drive: System 7.0.1.

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60-meter DAT Tape *$13*
90-meter DAT Tape *16*

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Do you need a fixed hard drive, or the flexibility of a floptical? Call us; we can explain your options.

Model number	Internal price	External price	Formatted Mac capacity (in MB)	Average access time (in ms)	Transfer rate* (in Mb/second)	Form factor**	Warranty (years)
80 - 120 MB							
Conner 85	CP-30080E	*$209*	*$279*	82	17	1.5	LP	1
Quantum 85	ELS85	*205*	*275*	82	17	1.4	LP	2
Conner 120	CP-30100	*259*	*329*	116	17	1.5	LP	1
Maxtor 120	7120XT	*229*	*299*	121	15	1.5	LP	2
120 - 250 MB							
Quantum 127	ELS127	*$259*	*$329*	124	17	1.4	LP	2
Conner 170	CP-30170E	*289*	*359*	160	9	1.5	LP	1
Quantum 170	ELS170	*279*	*349*	160	17	1.4	LP	2
Conner 212	CP-30200	*369*	*439*	206	12	2.5[1]	LP	1
Maxtor 213	7213	*329*	*399*	207	15	2.8	LP	2
Quantum 240	LPS240	*369*	*439*	234	10	1.4	LP	2
Maxtor 245	7245	*359*	*429*	245.6	15	3.0	LP	2
320 - 570 MB							
Maxtor 340	LXT-340	*$599*	*$669*	324	15	2.1[1]	HH	2
Fujitsu 520	M2624FA	*899*	*969*	496	9	2.7[1]	HH	5
Quantum 525	LPS525	*929*	*999*	500	10	3.2[1]	LP	2
Maxtor 540	MXT-540	*969*	*1039*	546	9	5.5[1]	HH	2
Conner 540	CP-3540	*899*	*969*	515	12	5.5[2]	HH	1
Micropolis 560	M2105	*1069*	*1139*	560	10	5.0[2]	HH	5
700 MB - 1.3 GB							
Quantum 700	PRO700	*$1249*	*$1319*	700	10	2.9[1]	HH	2
Micropolis 800	M2108	*1349*	*1419*	698	10	5.0[1]	HH	5
Toshiba 877	MK-438FB	*1099*	*1169*	830	12.5	3.0[1]	HH	2
Quantum 1050	PRO1050	*1419*	*1489*	1000	10	2.9[1]	HH	2
HP 1050	97558	*1649*	*1749*	987	13.5	2.8[1]	FH	5

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. *Low Profile (LP)=3.5 Half Height (HH)=3.5 Full Height (FH)=5.25*

[1] SCSI-2 [2] SCSI-2 Fast ***These drives are most efficient when used with a Macintosh Quadra 800, 950 or a RealTech SCSI-2 card.***

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Magic award-winning data storage products have the dependability you need. Manufactured on the premises, every Magic drive is personally inspected and tested to ensure the hilghest quality, every time. Our technicians must be completely satisfied before any drive is shipped. From premium components to the latest software and manuals, Magic delivers excellence. The faster you're up and running, the more productive you'll be. Magic. Hard Working Tools For Your Macintosh.

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Magic 127MB**	$279	$359
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Magic 80MB PowerBook*	$319	$399
Magic 120MB PowerBook*	$379	$459
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2400bps modem. 9600/4800bps send & receive fax.

Magic FX FaxModem $109
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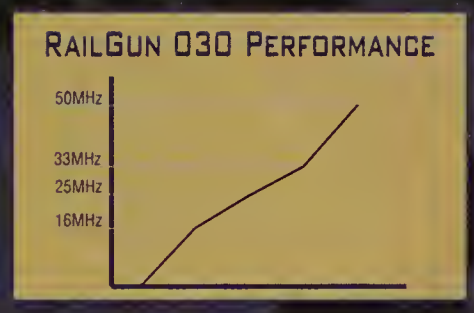
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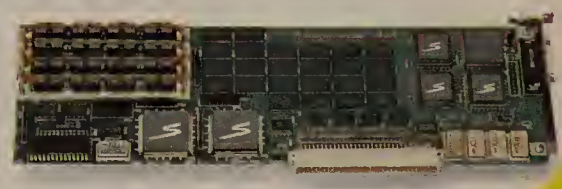
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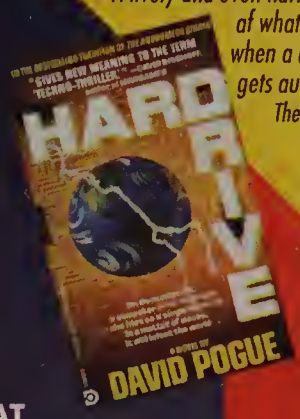
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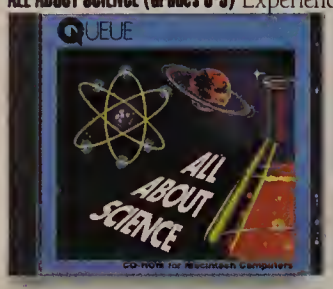
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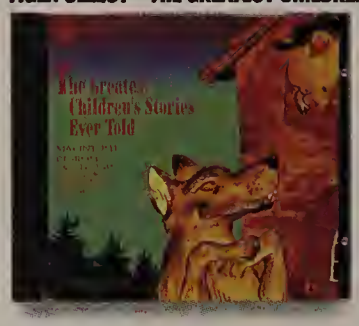
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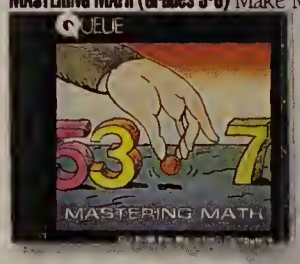


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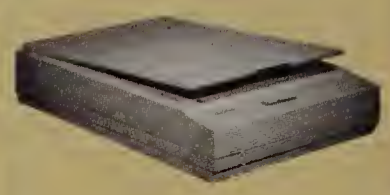
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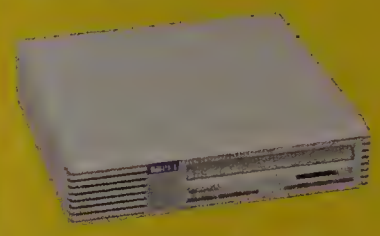
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DataPak External SyQuest Drives
44 MB 499
88 MB (R/W 44 MB) 639
105MB SyQuest 809
DataPak External Magneto-Optical Drives
128 MB 1,257
650 MB 3,019



$679 CD-ROM Drive

DataPak CD-ROM Drive
Zero-footprint enclosure, system cable, external active terminator, Audio CD software, CD Caddy
CD ROM - MultiSession 679
DiamondDrive™ External Hard Drives
120 MB 439
210 MB 529
510 MB 1,279
1000 MB 1,979
1800 MB 2,619
MassMicro Internal Hard Drives
120Mb 309
510Mb 1,159
1000 Mb 1,779
HitchHiker™ Ultra-Compact Hard Drives
Pocket size external enclosure, platinum color. Weighs less than 10 ounces.
80 MB 539
120 MB 639
HitchHiker Drives for the PowerBook
80 MB 569
120 MB 669

PINNACLE MICRO

PMO 650MB Optical Drive 2,875
PMO 130 Optical Drive 1,589
Recordable CD-ROM Drive 3,895

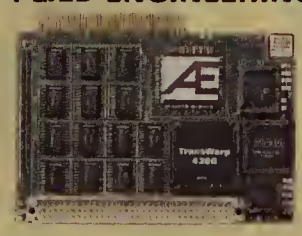
QUANTUM

Quantum 85 PRO 209
Quantum 127 PRO 239
Quantum 170 PRO 299
Quantum 240 PRO 399
Quantum 525 PRO 999
Quantum 1000 PRO 1,339

FWB, INC.

PocketHammer 120 MB Portable 689
PocketHammer 170 MB Portable 749
hammer240is 599
hammerDisk130 Optical 1,509
hammerDisk44/88 SyQuest 669/769
hammerPB120 569

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LC030-25MHz w/128k Cache 325
LC030-40MHz w/128k Cache 369
SE/Classic 030-25MHz 189
SE-030-25MHz 128k Cache 329
SE/Classic 030-40MHz 189
SE/Classic 030-40MHz 128k Cache . 399
Quadralink 209
Quadralink OMA 339
Plus Drive (3.5" 1.44Mb Floppy) 309
Quick Silver IIsi 32k Cache Card 209
Quick Silver IIsi 32k Cache w/FPU ... 269

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40MHz/40MHz w/FPU..... 559/649
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Adaptor (All Mac LC and II's, PDS)..... 41
Adaptor (Mac SE and Classic) 85
Combocache IIsi/w/FPU 219/299
Equilizer LC/w/FPU 169/239
DualPort IIsi w/20Mhz FPU 165



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Get the maximum in 68040 acceleration with all the compatibility of the PowerCache. The effective way to increase your productivity up to four times as fast! Optional 128k cache boosts performance another 4-50%.
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33MHz Turbo 040 1,389
FastCache Turbo 25 259
FastCache Turbo 33 345
FastCache IIsi/w/FPU 279/359
FastCache IIci 209
FastCache Quadra 700/900 269
FastCache Quadra 700/800/9/950 409
RAM Power Card 429
Charger 819
Disk Runner Nubus (0Mb) 619

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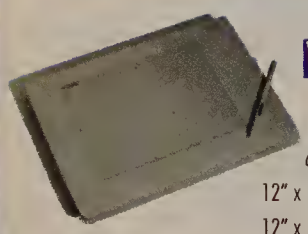
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6"x8" Pad w/Pressure Sensitive Pen
12" x 12" Electrostatic Toblet **$ 695**
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PLI

BBMb/44MB Syquest Drive **$ 649**
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CD ROM Drive **$ 639**
Fast Multi Session, Photo CD, 200MS

UMAX

UC 840 (800DPI) **$ 1349**
with PhotoShop 2.5 & WordScon



COLOR SCANNER SUPER DEAL $ 999
1200 DPI Color Sconner w/Software Interpolotion, Software Bundle

PRINTERS

newgen Newgen Systems Corporation

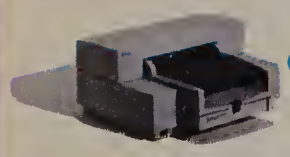
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DeskWriter $399



SEIKOSHA Mac Printer
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ImageWriter II Compatible

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If You have Questions about Any of the products on this page (or any of our 100s of other name brand items) Please Call Us. We pride ourselves on our Friendly, Specially Trained Mac Computer Specialists. They're not there to act as operators or order takers, they're there to help you intelligently configure a system based on your personal needs. They're there to answer all your questions and concerns, before you buy. And our comprehensive, TOLL-FREE Technical Support line is there to answer any of your questions or needs once your system is in place. **We truly are the Mac Solutions Experts.** Call us, and see for yourself what a difference a friendly, helpful, Computer Specialist can make.

MAC SYSTEMS



All Systems Featured Below include the ABC Software Bundle: Symantec GreatWorks, Norton Utilities, MAXA Snooper and Casa Blanca Works Drive7

Quadra 800 SuperSystem $299 p/m on lease*
- Mac Quadra 800 with 8MB RAM, 500MB Hard Drive, CD ROM Drive
- SuperMac 17•T Trinitron Monitor
- HP 4M 600DPI Laser Printer
- UMAX UCB40 24-Bit Scanner
- Quark XPress, Aldus FreeHand
- Extended 101 Keyboard
- ABC Software Bundle & Cables

Centris 650 PowerSystem $4949/$186 p/m*



- Mac Centris 650 with 8MB RAM, 230MB Hard Drive, CD ROM Drive
- SuperMac 17•T Trinitron Monitor & 16-Bit VRAM
- Extended 101 Keyboard
- ABC Software Bundle
- Cables

Centris 650 HomeSystem $3969/$149 p/m*
- Mac Centris 650 with 4MB RAM, 80MB Hard Drive
- VividView 14" Color Monitor
- GCC BLP Elite Postcript Laser Printer
- Extended 101 Keyboard
- ABC Software Bundle & Cables

LC III Student System $1799
- LC III 4/80 with VividView 14" Color Monitor
- Keyboard, Mouse & ABC Software Bundle



LC III Home System $2899
- Mac LC III 4MB RAM, 80MB Hard Drive
- VividView 14" Color Monitor
- GCC BLP Elite Postcript Laser Printer
- Prometheus 2400 Data/ 9600 Fax Modem
- Keyboard, Mouse & ABC Software Bundle



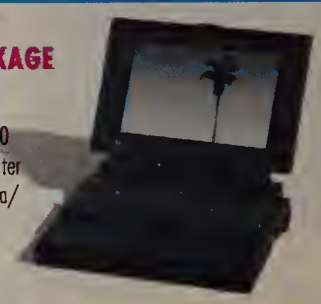
Prometheus Modems Fax/Data/VoiceMail

Ultima Home Office (14.4 Data/Fax + VoiceMail) $ 359
PowerBook Ultima (14.4 Data/Fax + VoiceMail) $ 299

POWERBOOK

The ABC *PowerBook 180 Executive Package* and the *PowerBook 160 Traveling Salesman Package* Below Feature the ABC Software Bundle:
Symantec GreatWorks, Norton Utilities, MAXA Snooper & Casa Blanca Works Drive7.

PowerBook 180 EXECUTIVE PACKAGE
$5469/$195 p/m*

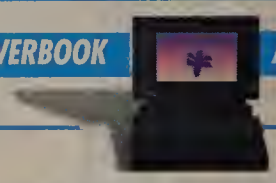


- PowerBook 180 4/120
- WriteMove Portable Printer
- Prometheus 14.4BPS Data/ Fax/VoiceMail Modem
- Targus Leather Case
- ABC Software Bundle

TRAVELING SALESMAN $3889/$106 p/m*
- **POWERBOOK 160 4/80**
- Prometheus Ultima Home Office 14.4 BPS Fax/Modem/VoiceMail
- GCC WriteMove Portable Printer
- Targus Leather PoweBook Case
- 4x Auxillary Battery Pack
- ABC Software Bundle

STUDENT SPECIAL $1995
POWERBOOK 145 4/40 ***BLOWOUT!***

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PowerBook 40MB Int. Hard Drive Upgrade.....$ 195
PowerBook 40MB Ext. Hard Drive (w/Battery!) .....$ 249
Connectix CPU (Great Battery-Saving Utility,etc.).....$ 49
Pilot Book-Ends PowerBook Docking System .....$ 129
Sophisticated Circuits Numeric Keypad (w/Function Keys!).....$ 89



Targus Deluxe Leather Case.....$ 129
Targus New PowerBook Case.....$ 49

VIDEO

SUPERMAC



17•T BUNDLE 17•T WITH Spectrum 24 Series 4 Cord **$ 1899**
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Bernoulli MacTransportable MultiDisk 150

Enjoy all the benefits of a Bernoulli with the flexibility to read and write to disks of many capacities – 35MB, 65MB, 105MB, and 150MB. And the MultiDisk 150 is downward compatible so it reads and writes to 90MB disks and reads 44MB disks. You get unlimited storage expandability, lock-away security, and transportability. The patented Bernoulli design resists head crashes and the sturdy disks can survive a drop of eight feet! This Bernoulli is internally terminated with a single external SCSI connector, so it must be installed as the last device on your SCSI chain. Get lots of storage while you're at it with a cartridge tri-pak and save up to $26. (#5609, IOMEGA)

Minimum requirements: Mac Plus, System 6.0.

$398. 150MB Cartridge Tri-Pak (#5707, limit 3) Save $26.
$398. 90MB Cartridge Tri-Pak (#3503, limit 3) Save $20.

$538.



Painter 2.0/ArtZ bundle

Create original art or apply fantastic effects to other artwork including scanned images with new Painter 2.0. New features include color separation, spatter airbrush, Cubist effect, and multiple light sources. Used with the ArtZ 6"x 8" tablet, the effects are astonishing. The latest from the premiere tablet maker, ArtZ's stylus is cordless, batteryless, and detects 120 levels of pressure. (#5657/5355, Fractal Design/Wacom Technology Corp.)

Minimum requirements: SE 30, 2.5MB RAM, System 6.0.5.

$96.

NEW!



Aldus IntelliDraw Competitive Upgrade

Move to IntelliDraw from any other drawing software. It's so unique it actually does much of the drawing for you. Professional-looking flow charts, maps, and more are all a snap with IntelliDraw. Create symmetrical graphics instantly with the exclusive Symmetrigon feature. Diagrams are effortless with "sticky" connector lines. Change one "master" object and all linked objects are altered. (#6191, Aldus)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5, 4MB RAM under System 7.

$288.



SupraFAXModem V.32bis Mac Pac

Get a top-of-the-line fax/data modem at an amazingly affordable price! The SupraFAXModem V.32bis features 14,400 bps communications with up to 57,600 bps throughput with another modem that supports both V.32bis and V.42bis data compression. And it maintains downward compatibility with the millions of V.32, 2400, 1200 bps modems already in use. (#4017, Supra)

Minimum requirements: Mac Plus.

NEW!

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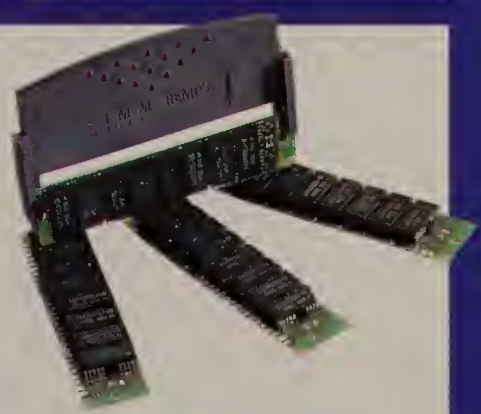


MacAcademy Videos

Learn programs the easy way. Videos let you see each technique on the Mac screen. MacAcademy videos have no blurry screens, no paid actors reading scripts, and no frills. Each features one of their top trainers recreating the classroom atmosphere. *Macworld* readers chose MacAcademy as the top trainer in the nation in 1992. (MacAcademy)

$32. System 7.1 Tape #1 (#6254)
$32. PowerBook #1 – In The Office (#5826)

$34. each



1MB 80ns SIMM

If you're moving up to System 7, need faster task processing, or want several applications open at once, you may need more memory. Mac's Place makes upgrading your Mac's memory easy with our lifetime warranted SIMMs. And they're easy to install with the included illustrated guidebook and FREE SIMM Remover. It's made of anti-static plastic and removes SIMMs safely from desktop Macs and PCs. Don't know how many SIMMs you need? Call and talk to one of our Mac consultants. Just let us know what kind of applications you're running, and we'll make sure you get what you need – a faster more productive Mac. (#3179, Mac's Place)

$9. or FREE with SIMMs, SIMM Remover (#5319, Stratos)

$100 rebate



NEC 24-bit Accurate Color

MacUser Magazine

Advanced display technology and superior screen performance are more affordable than ever. With larger screens, high refresh rates, and support for multiple resolutions including the 1024 x 768 resolution of the Centris 610 and 650 and Quadra 800 and 950, MultiSync monitors give you bright, clear images and flexibility. The 4FGe shown provides the productivity advantages of a larger 15" screen with digital controls and support for many resolutions. It also includes the AccuColor control system, making it ideal for color-intensive 16- or 24-bit applications. (#6262)

The MacFG 24Xp Color Interface Card maximizes the display performance of FGe series monitors with 24-bit color. (#5918, NEC)

$699. MultiSync 4FGe
$498. MacFG 24Xp Display Interface nubus slot
***Get a $100 manufacturer's rebate you get when you buy both the monitor and card.**
Expires June 30, 1993.



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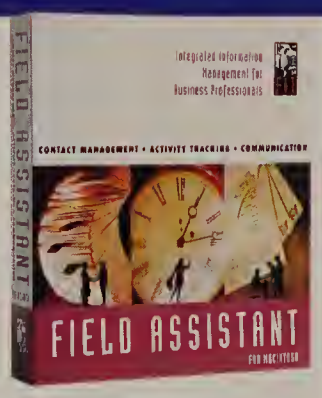
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$148.

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Field Assistant/ FileRunner Bundle

A Mac's Place exclusive! Get FileRunner **FREE** with Field Assistant. (Look for FileRunner on next page.) Assemble and access information related to every aspect of your professional and personal life. Field Assistant handles an unlimited number of contacts and limitless phone numbers and addresses for each one. Track associated people like spouses of your contacts. Calendar, contact, and correspondence functions are seamlessly integrated. And managing your calendar is easy with drag-and-drop rescheduling. Field Assistant includes full-featured WYSIWYG word processing with multiple fonts and formats. Whether it's managing contacts, companies, activities, correspondence, or communication, Field Assistant's fast relational database technology does it all. (#6279, FIT Software)

Minimum requirements: Any Mac running System 7, 2MB RAM.



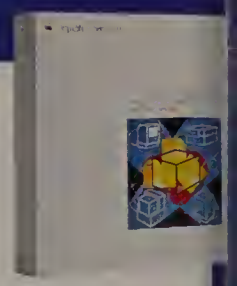
$149.

AppleTalk Remote Access

Communicate with another Mac or AppleTalk network over standard telephone lines with AppleTalk Remote Access. It gives you direct and convenient access to information and resources at a remote location. Get files from your office and bring them up at home, check your e-mail, print to a remote printer – all with AppleTalk Remote Access.
(#4610, Apple Computer)

Minimum requirements: Mac Plus, 2MB RAM, System 7.0.

$958.



AppleShare Server 3.0

This powerful file server allows shared file storage for up to 120 users and queued access to five network printers. This version improves security with minimum password length, adjustable time limits for temporary accounts, and more. Share CD-ROMs or removable hard disks, too. The AppleShare Server supports multiple operating environments allowing access to Mac, Apple II, and MS-DOS computers.
(#4611, Apple Computer)

Minimum requirements: a dedicated Mac Plus, 4MB of RAM, System 7.0.

1992

POWERBOOK RECOMMENDED

$89.



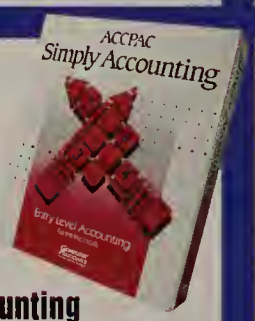
Times Two

Is your hard disk bursting at the seams? Get TimesTwo! An easy, one-time installation expands your disk capacity as much as 100 percent in minutes. Unlike file compression products, TimesTwo works by transparently compressing disk blocks, not files. So when you move a file from your TimesTwo hard disk to another device or across a network, it arrives in its original form. TimesTwo is compatible with all Mac software, including file recovery programs, and works with all SCSI disks. See for yourself why TimesTwo was a 1992 *MacUser* Editor's Choice finalist! (#5233, #5600, Golden Triangle)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.4.

Get a SyQuest Cartridge for only $60 with the purchase of TimesTwo. (#2269, limit 5)

$118.

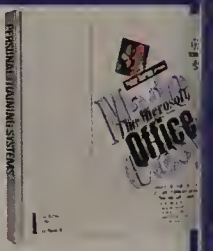


Simply Accounting

Simply Accounting contains everything you need to get up and running in a flash. The primer walks you through basic accounting principles, and includes a real-life tutorial with sample data. Yet it has all the practical, powerful features you need to grow a successful business. Reports, General Ledger, Accounts Receivable/Payable, payroll, and much more.
(1366, Computer Associates)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.

$148.*



The Microsoft Office Made Easy

Get a $20 rebate from Personal Training Systems! If you're looking for the easiest way to master software, you've come to the right product. This package includes three tutorials covering the basics of Excel, Word, and PowerPoint. Each tutorial contains a practice disk, quick reference card, extra practice card, and audio cassette.
(#6251, Personal Training Systems)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.2, a cassette player, 4MB RAM under System 7.

***Price after $20 rebate.**



$328.

DataPlace + 85MB Drive

The longer you own your Mac, the more you'll find yourself wanting more hard drive space. All DP+ drives feature a sturdy case, two metal-clad SCSI connectors, external fuse, easily accessible SCSI ID switch, manuals, cables, a two-year warranty, and instant technical support from Mac's Place. Plus you get MacTools 2.0, DP Formatter Plus, SpaceSaver, and Kaboom! SE, **FREE**.
(#5278, DataPlace)

$998. DP+ 240MB (#4195)

$145. each



NEW!

Retrospect 2.0
Retrospect Remote 2.0

Retrospect provides powerful backup and storage management. If your hard disk crashes, Retrospect can restore it to its pre-disaster state and get you back up to speed in minutes. (#6048) Retrospect Remote is centralized backup and archive software for Macintosh networks. Complete automation allows for daily, unattended backup of ten Macs to a single storage device.
(#6050, Dantz Development)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5, a hard disk, 4MB RAM under System 7.

$748.

NEW!



Infinity 105

The Infinity 105 is the smallest and fastest removable SyQuest drive available. It provides sustained data transfer rates of up to 1.75MB/sec. and access time of 14 ms. It allows you unlimited storage capabilities by simply adding additional 105MB 3.5" cartridges. The Infinity 105 is an ideal storage device for animators, on-line editors, and users of interactive multimedia who need to take their shows on the road. It's about the size of a paperback novel so it's a perfect portable storage solution. And it can also be daisy-chained to other devices for desktop use with an external power supply. (#6255, PLI)

$99. SyQuest 105MB 3.5" Cartridge (#6256)

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WordPerfect for Macintosh 2.1.3

You can paste QuickTime movies into your documents and share data via Publish and Subscribe through this full-featured favorite. And it handles graphics, too. Edit, size, scale, and crop graphic images with ease. The tool palette and drawing commands let you create and edit graphics in WordPerfect! You also get Grammatik 5 **FREE**. It checks spelling, grammar, and punctuation against 58 rules. (# 4111)

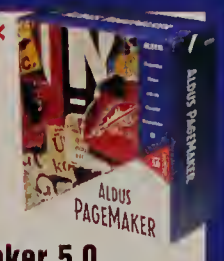
LetterPerfect is a streamlined version of WordPerfect that requires less memory and disk space. It's perfect for Classic, LC, and SE owners needing formatting, page layout, and word processing tools. Create columns, format with the Ruler, and add graphics. (WordPerfect)

Minimum requirements: Mac Plus, System 6.0.3, 1MB RAM for WordPerfect, System 6.0.5 for LetterPerfect.

$84. LetterPerfect (#5692)**

***Price after $20 rebate, **Price after $10 rebate. System 7 purchase required.**

$583.*



NEW!

Aldus PageMaker 5.0

The long-awaited 5.0 is here! A few of the new 5.0 features: incremental rotation of text and graphics, built-in color separation, multiple open publications, and interruptible screen redraws. If 5.0 isn't released when you call, order 4.2 to get in on the rebate with your System 7 Upgrade purchase. Then you'll get an upgrade to 5.0 **FREE** from Aldus as soon as it's available. (#6287, Aldus)

$479* Aldus PageMaker 4.2 (#4024)

Minimum requirements: LC or Classic, 4MB RAM, System 6.0.7, a 20MB hard drive.

***Price after $15 rebate. System 7 purchase required.**

$49.*



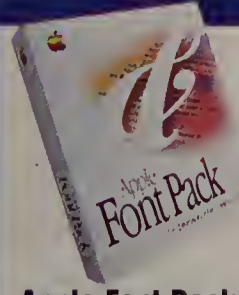
S.A.M. 3.5

S.A.M. is the only program that scans automatically at prescheduled times. It scans files, folders, and volumes for known and unknown viruses, repairing infections caused by known viruses. S.A.M. even scans compressed files, no matter what type of compression software is used. And it now has a color interface that makes it even easier to use. (#5591, Symantec)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.7, 2MB of RAM under System 7.

***Price after $15 rebate. System 7 purchase required.**

$51.*



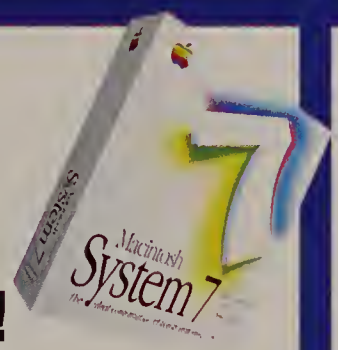
Apple Font Pack

When you've finally found the right words, make sure you've got the right font. This is a carefully chosen selection of 43 TrueType fonts. They're expertly crafted to provide excellent results – maximum legibility on screen and crisp output on paper. The Apple Font Pack includes new display, text, and symbol faces to give you a wide range of type choices. (#5248, Apple Computer)

Minimum requirements: Mac Plus, System 7.0, a hard disk.

***Price after $15 rebate. System 7 purchase required.**

$79.



Take off with System 7!

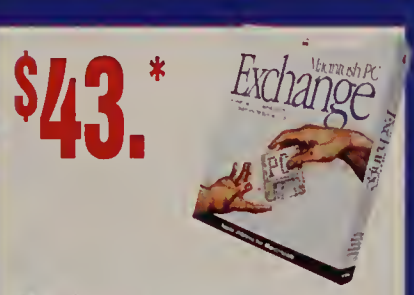
And get these great after - rebate prices!*

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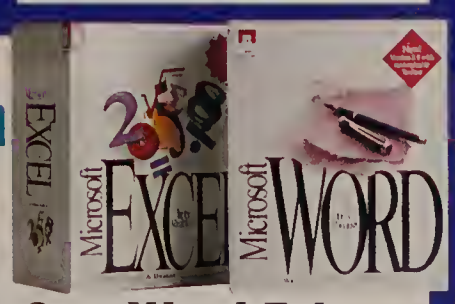
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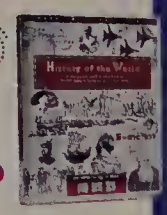
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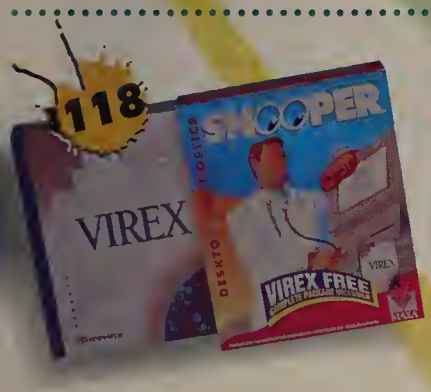
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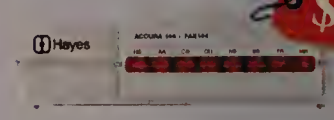
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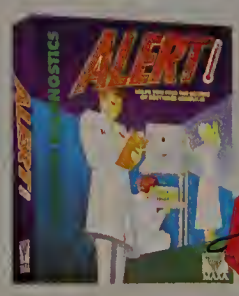


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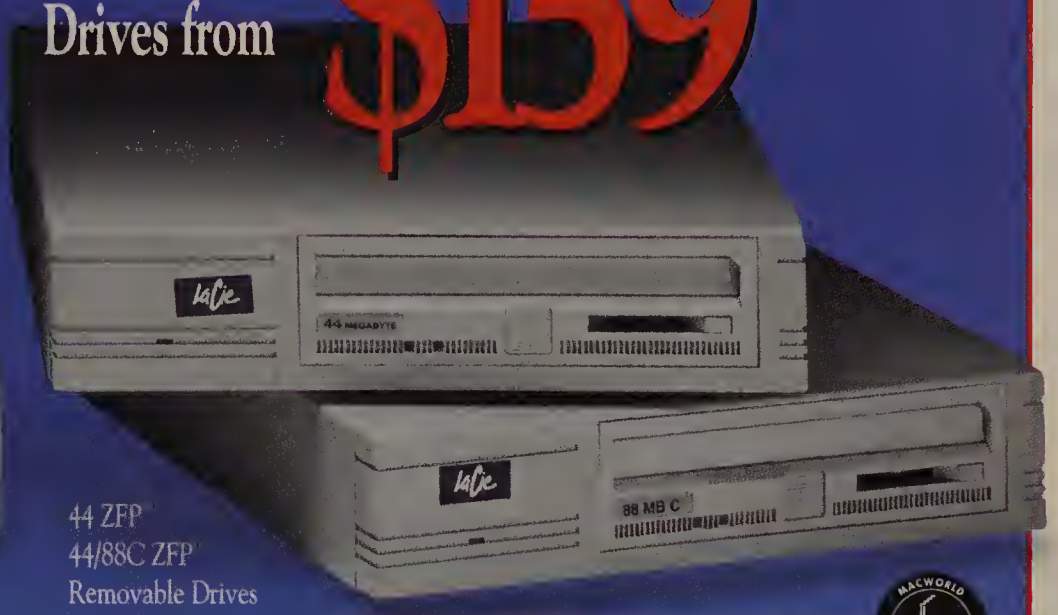
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Silverscanner II™

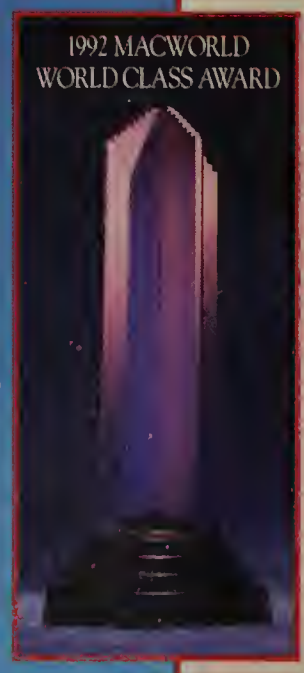
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525MB	LPS525	3.5 1"	10	$869	$929
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1.2GB	PRO1225	3.5 HH	10	$1399	$1459
80MB	Go•Drive	2.5	17	$289	$379
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• GO•drives one year warranty					
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88MB	IMS 88MB External			$489	$899
88MB	IMS 88c External	*NEW!*		$589	
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540MB	MXT540SL	3.5 HH	8.5	$899	$959
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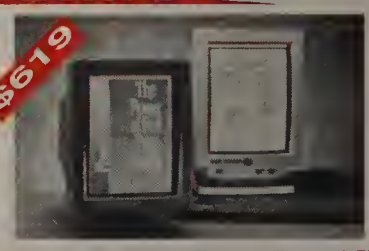
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40MHz	$545	$635
50MHz	$715	$8495
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4MB RAM 80MB Drive **$2349**	4MB RAM 120MB Drive **$2649**	4MB RAM 120MB Drive **$3629**	4MB RAM 120MB Drive **$2999**	4MB RAM 120MB Drive **$1999**	4MB RAM 120MB Drive **$2525**	4MB RAM 80MB Drive **$1325**	4MB RAM 120MB Drive **$1399**	5MB RAM 80MB Drive CD-ROM **$1849**	8MB RAM 230MB Drive CD-ROM **$2579**	8MB RAM 230MB Drive CD-ROM **$3499**	8MB RAM 500MB Drive **$4629**	8MB RAM 520MB Drive **$5379**
SPECIFICATIONS												
25MHz 68030 FPU Option	25MHz 68030 FPU Option	33MHz 68030 Built-in FPU	33MHz 68030 Built-in FPU	25MHz 68030 FPU Option	33MHz 68030 FPU Option	16MHz 68030 FPU Option	25MHz 68030 FPU Option	33MHz 68030 FPU Option	20MHz 68040 No FPU	25MHz 68040 FPU Option	33MHz 68040 Built-in FPU	33MHz 68040 Built-in FPU
10" Mono Passive Matrix	10" 16-gray Backlit LCD	10" 16-gray Active Matrix	10" Color Passive Matrix	9" 16-gray video out	9" 16-bit gray video out	10" 8-bit Trinitron tube	video output 8-bit 12 to 14"	video output 8-24bit 12 to 14"	video output 8-bit 12 to 16"	vioeo output 8-bit 12 to 16"	video output 8-bit 12 to 16"	video output 16-bit 12 to 16"
1 PDS	1 PDS	1 PDS	1 PDS	Dock Connector	Dock Connector	1 PDS	1 PDS	1 PDS 3 Nubus	1 PDS	1 PDS 3 Nubus	1 PDS 3 Nubus	1 PDS 5 Nubus



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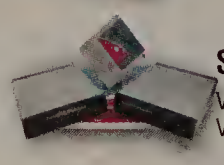
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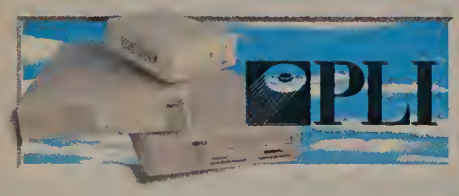
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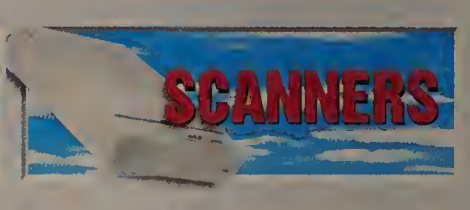
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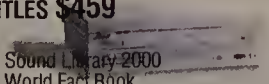
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AE TransWarp LC 33MHz with FPU	$895
LogiCache 50MHz w/ 68882	$775
LogiCache IIci 64K	$169
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Practical Peripherals PM9600SA	$299
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Zoom AFX External 96/48 S/R Fax	$99

Drives & Tapes

Internal / External Kit	$29 / $99
Applied Engineering 1.44 / Plus	$209 / $283
Bernoulli Pro 90MB with interface	$539
DGR 128 3.5" MO	$989
DGR 256REM MOST 3.5" MO	Call
Fujitsu 520MB/1.2GB/2.4GB	$799 / $1199 / $2399
NEC CDR-37 / CDR-74 CD-ROM	$406/$849
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Asanté MacCon +IIe 64K	$159
Dayna EtherPrint / Plus	$326/$425

Dataproducts LZR 960 Printer $1579



Dataproducts Jolt Printer $4149

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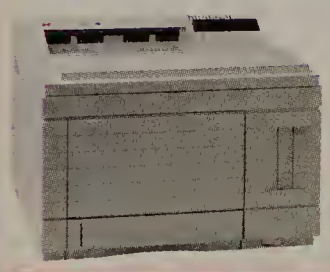


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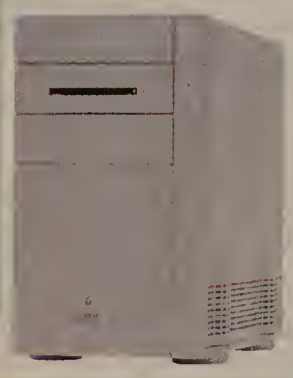
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Circle 105 on reader service card

Quantum



Unformatted Capacity	Model	Average Access	Actual MAC Capacity	Internal	External
GO•DRIVE SERIES (2.5" DRIVES FOR PWRBKS)					
80mb	GO•80	17ms	80mb	$289	$389
120mb	GO•120	17ms	120mb	$339	$439
ELS SERIES (3.5" LOW PROFILE AND LOW POWER)					
42mb	ELS42	19ms	40mb	$169	$229
85mb	ELS85	17ms	82mb	$195	$255
127mb	ELS127	17ms	124mb	$229	$289
170mb	ELS170	17ms	160mb	$259	$319
LPS SERIES (3.5" LOW PROFILE)					
120mb	LPS120	10ms	116mb	$269	$329
240mb	LPS240	10ms	234mb	$339	$399
525mb	LPS525	10ms	525mb	$869	$929
PRODRIVE SERIES (3.5" HALF HEIGHT)					
425mb	PRO425	9ms	406mb	$739	$799
700mb	PRO700	10ms	700mb	$1099	$1159
1.0GIG	PRO1050	10ms	1001mb	$1219	$1279
1.2GIG	PRO1225	10ms	1165mb	$1359	$1419

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VIDEOVISION $1949
Presentation Systems incl. Adobe Premiere 2.0

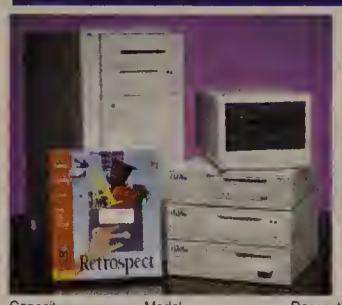
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PRECISIONCOLOR PIVOT..... $935
PRECISIONCOLOR 20 OR 20/S..... $2319
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TWO PAGE DISPLAY 19 / 21 / 21E..... $875 / 1139 / 1299

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PRECISIONCOLOR 24XP / 24XK..... $489 / 815
UNIVERSALCOLOR 24-SMALL / LARGE..... $499 / 839
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3-5GIG	Archive Turbo DAT	DAT, DDS-DC	$1329	$1349
2.0GIG	HP 35470A	DAT, DDS	$1269	$1289
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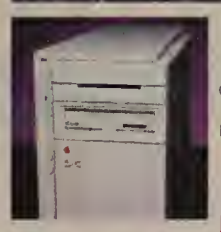
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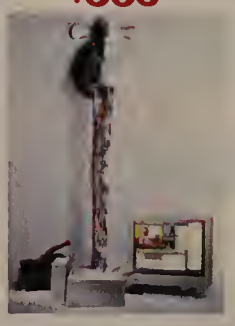
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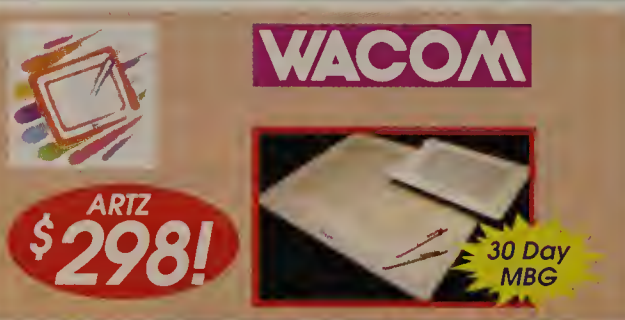
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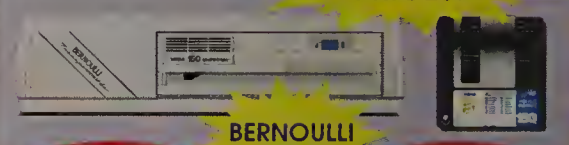
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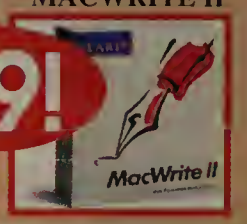
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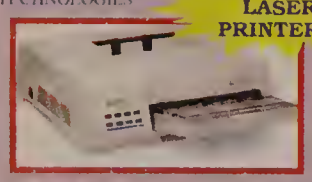
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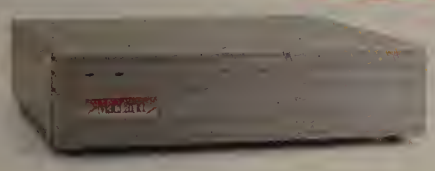
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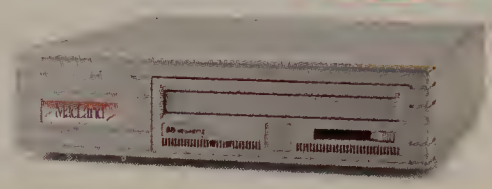
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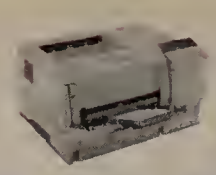
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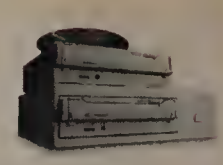
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CD-ROM				
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Duo 210/230	
4mb/6mb/8mb/10mb	$210/$299/$399/$499
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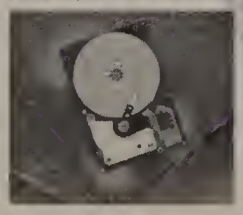
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ELS 170mb	17ms	3.5"TH	$259	$319
LPS 240mb	10ms	3.5"TH	$339	$399
LPS 525mb	10ms	3.5"TH	$869	$929
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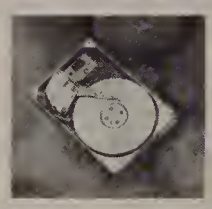
Formatted Capacity	Speed	Size	Internal	External
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Maxtor

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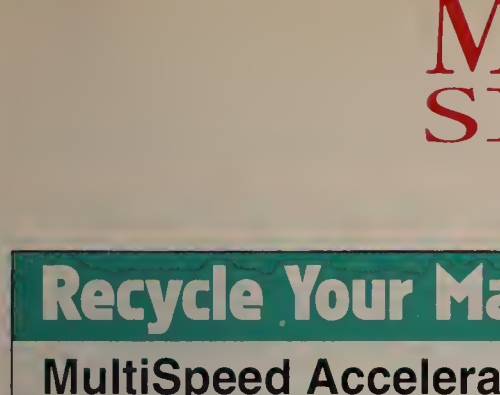
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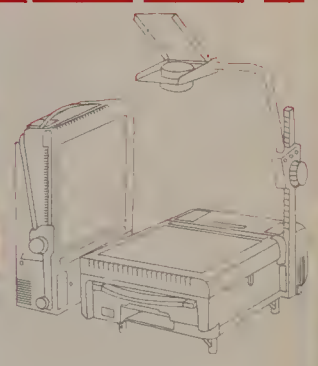
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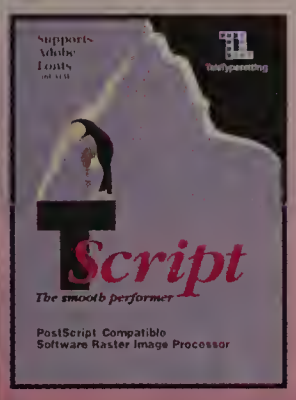
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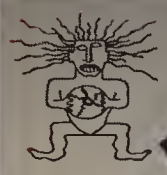
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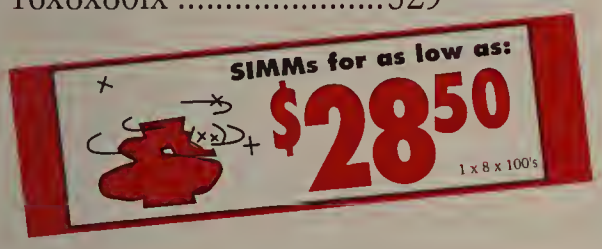
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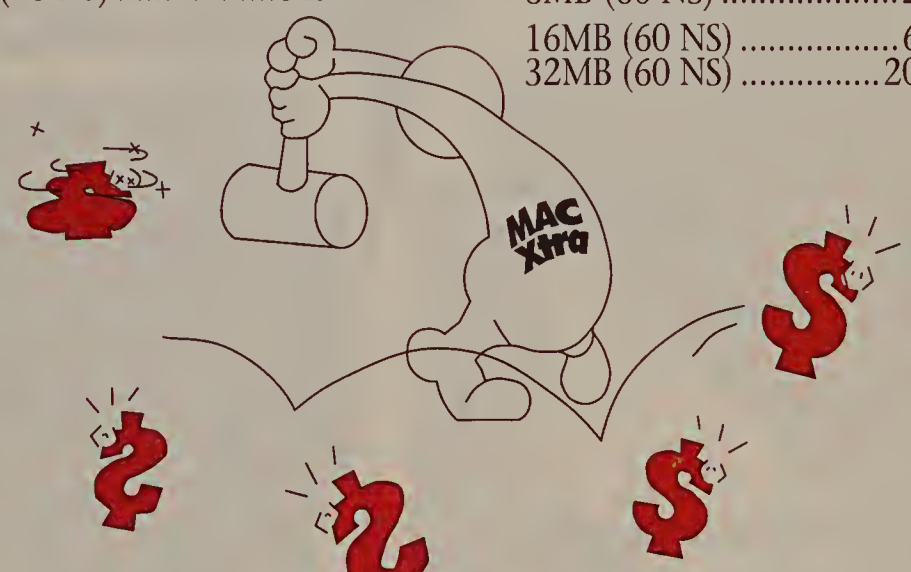
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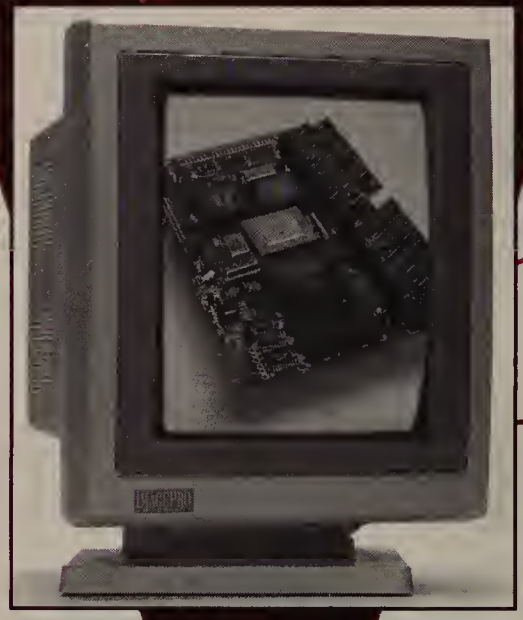
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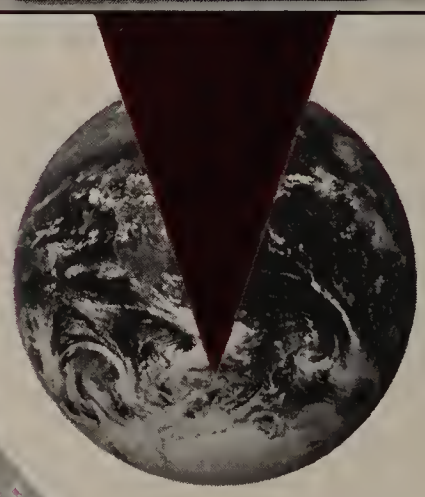
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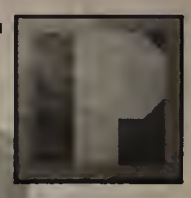
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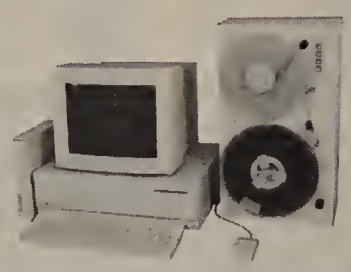
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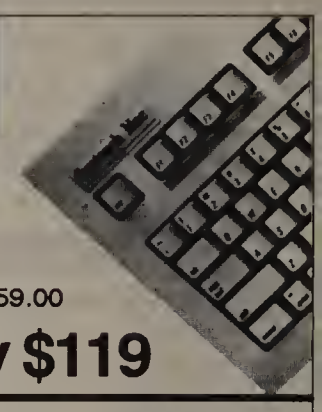
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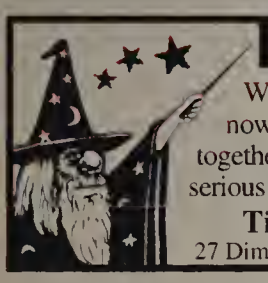
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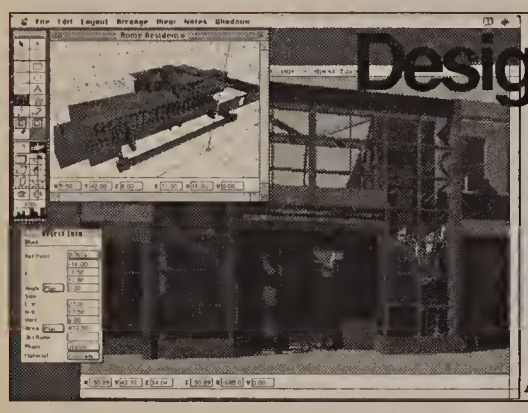
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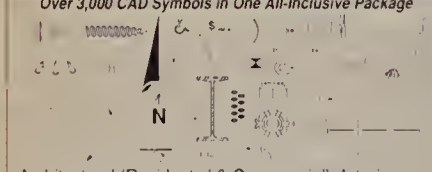
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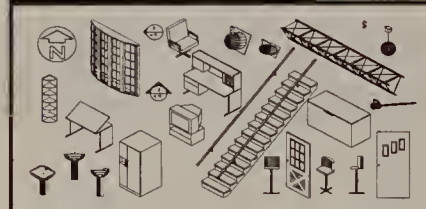
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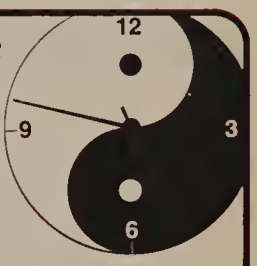
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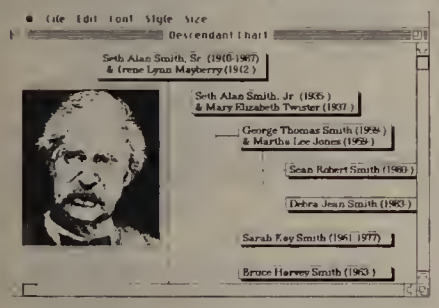
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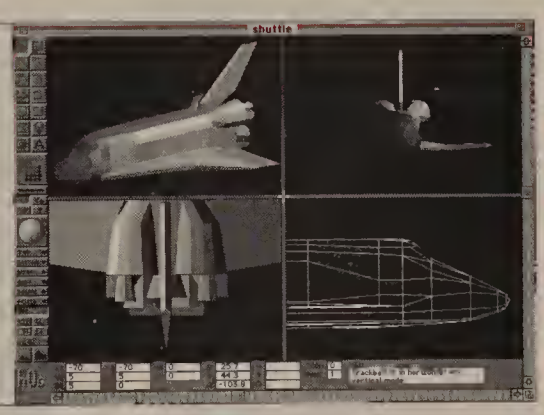
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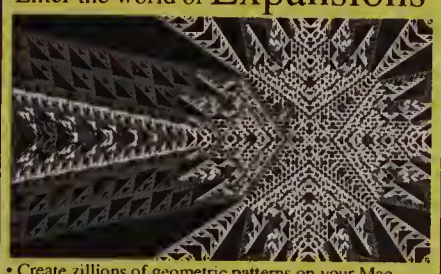
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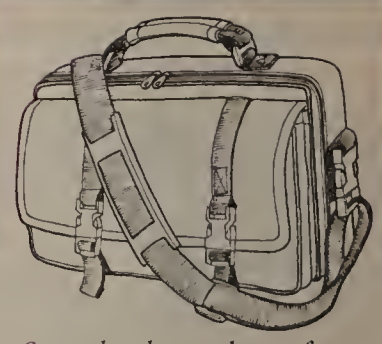
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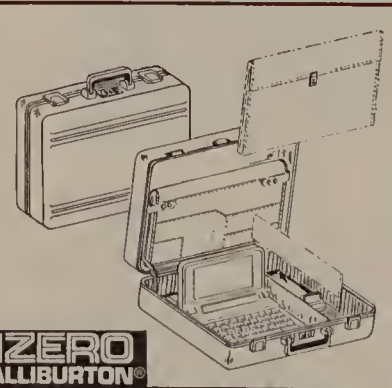
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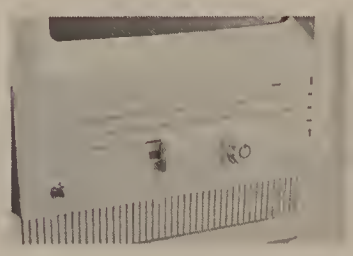
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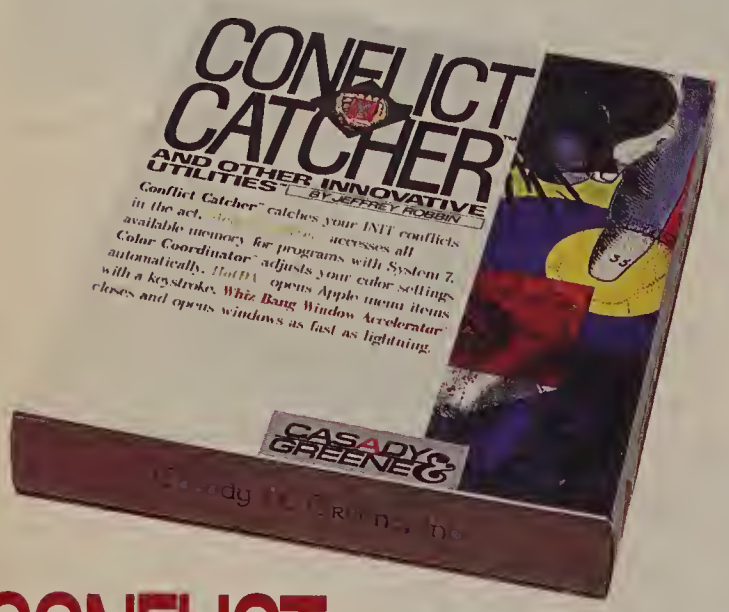
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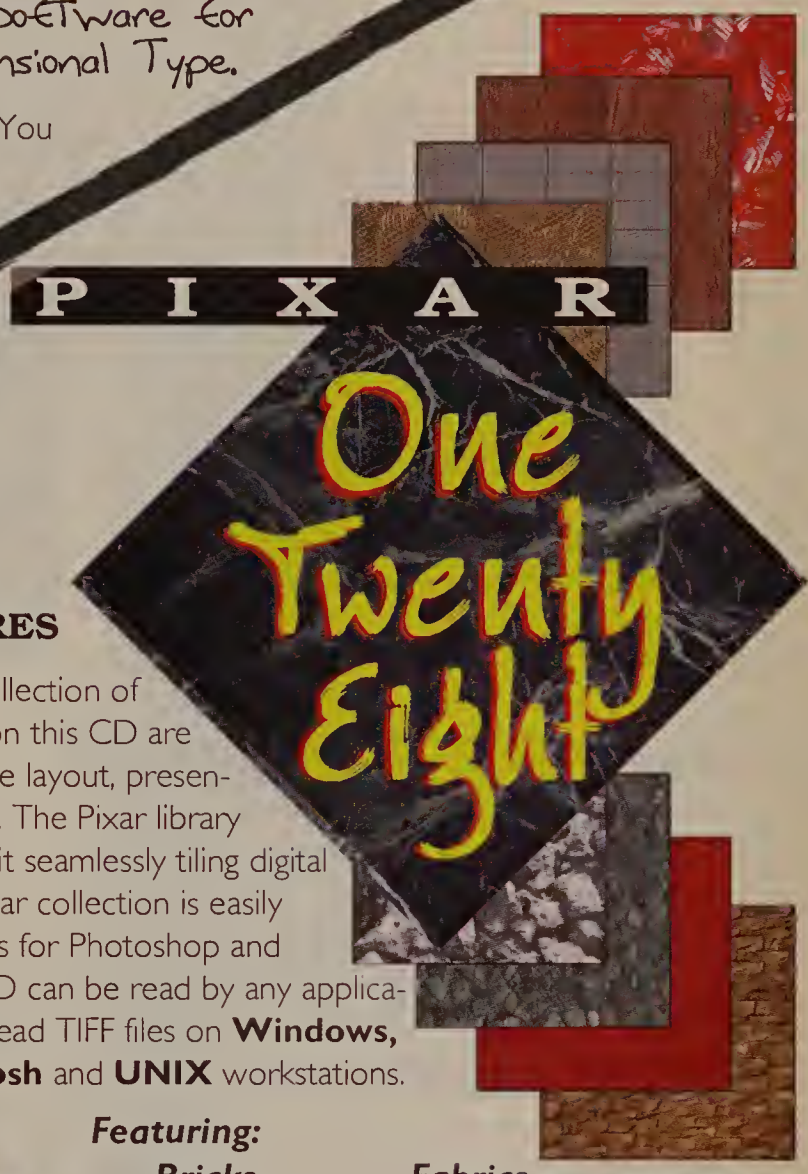
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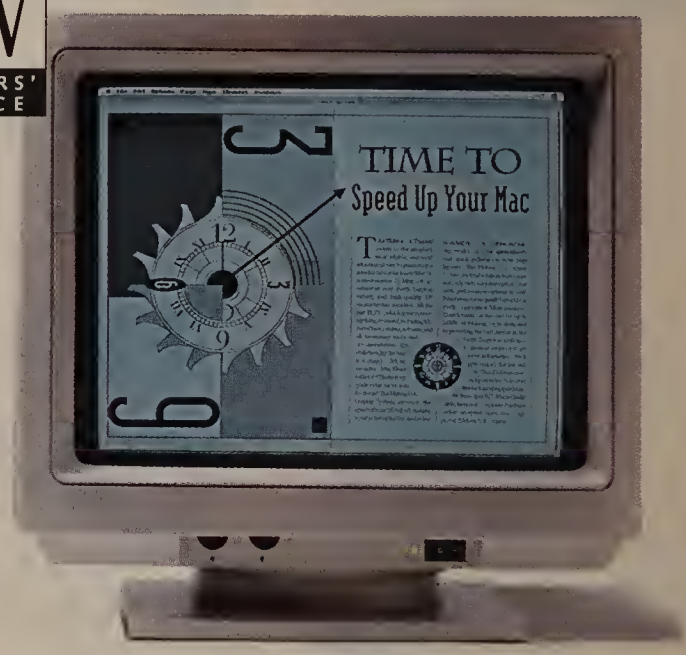
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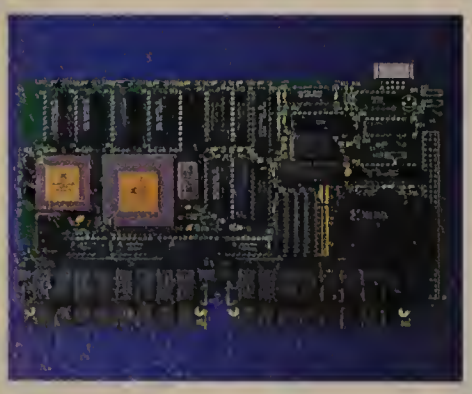
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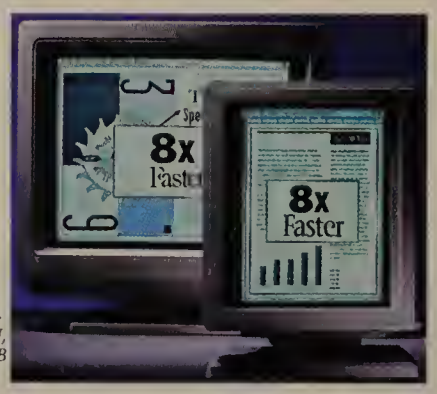
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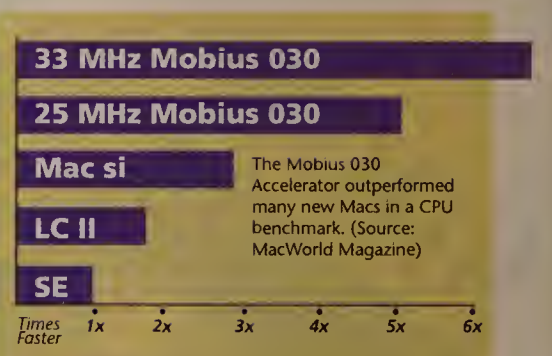
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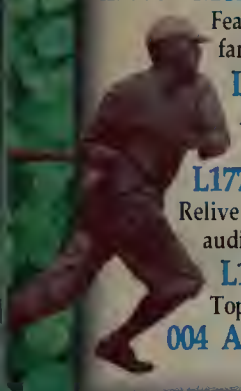
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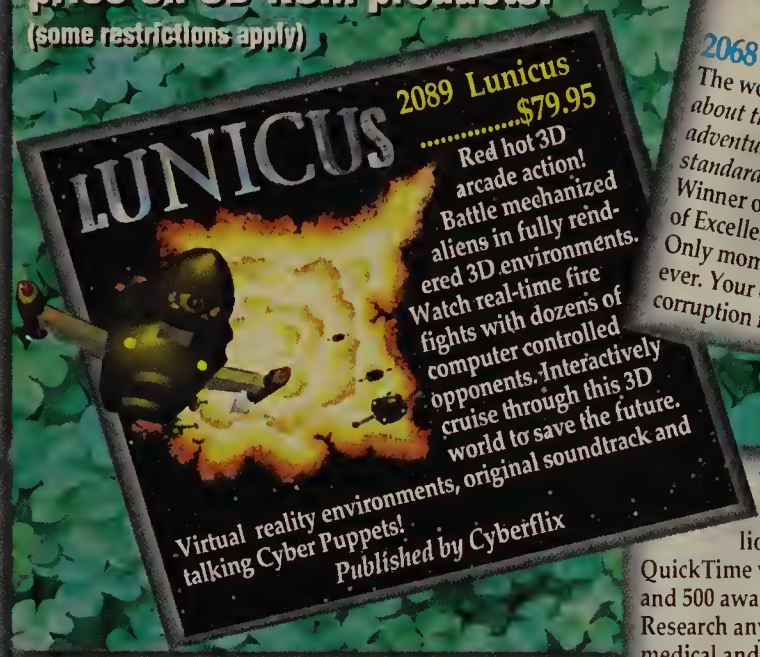
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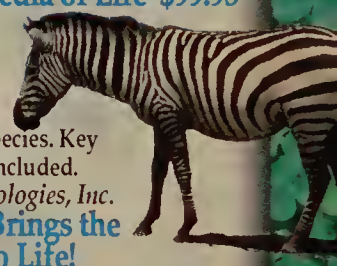
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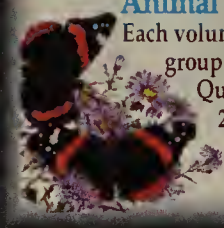
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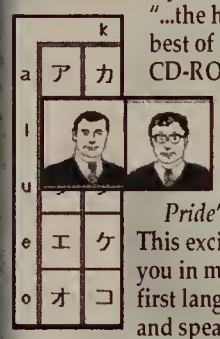
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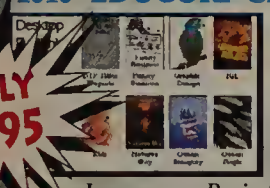
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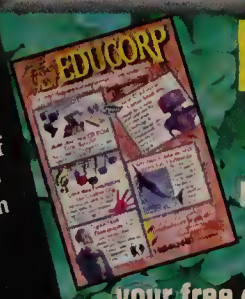


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The F-15 vs. the Quadra 950

BY GUY KAWASAKI

WHEN YOUR COUNTRY's Air Force calls, a red-blooded Macintosh owner goes. In this case, Lt. Gen. Thomas McInerney called to make me an offer I couldn't refuse: a ride in an F-15. I just had to get to Elmendorf Air Force Base in Anchorage, Alaska, and convince Beth, my wife, that this was a safe thing to do. Guess which was harder.

Why did General McInerney call *moi?* He read *The Macintosh Way*, in which I describe how in 1986 I offered to trade a Macintosh II prototype for a ride in an F-16. I responded to his offer within nanoseconds. "I'm your man, General."

The only way *Macworld* will let me write about an F-15 is if I compare it to the fastest Quadra, the 800. So here are the pertinent product specifications of both. (Try as I might, I couldn't figure out how to get a bar graph out of these specs.)

	Quadra 800	F-15 Eagle
Primary function	Graphics, desktop publishing, and other wimpy applications	Air-to-ground tactical attack
Weight	25.3 pounds	40,000 pounds
Height	14.25 inches	18.5 feet
Length	16 inches	63.8 feet
Speed	33 megahertz	Mach 2.5 plus
Crew	Owner and jealous spouse	Pilot and weapon systems officer (or scared *Macworld* columnist)
Power plant	Motorola 68040	Two Pratt & Whitney F 100-PW-100 Turbofan engines with afterburners
Cost	$6399 (8MB of RAM, 1000MB hard drive)	$35 million

Preparations

USING A QUADRA 800 IS EASY: YOU JUST have to find a dealer with one in stock, or an Apple-certified developer who'll buy you one through the developer discount program. Then you open the box, hook up a few cables, and you're set—at least until you start using Microsoft Word.

Flying in an F-15 is more involved. The process started at 0900 when a protocol officer picked me up at my quarters and took me to the base hospital. In my pseudomacho way, I asked if crashes were rare, and she responded, "Oh no, we've had two crashes already this year: one on a runway and one flew into Mount McKinley." Great—how will my wife know how to install fonts if I die?

At the hospital I had a medical examination by Edwin C. Telfer, Major, USAF, MC, FS (he'd have a tough time getting a screen name on America Online) to make sure I'd survive the flight. I passed, and he signed my Medical Recommendation for Flying or Special Operational Duty. (Maybe Apple should give IBM PC owners who are thinking of buying Quadras a medical examination too.)

Next I was fitted with boots, a flight jacket, jumpsuit, a G suit, gloves, and a helmet. Looking for all the world, in my opinion, like a Japanese Tom Cruise, I went through a 45-minute training session on how to get in and out of the cockpit.

Ingress is a piece of cake: Hooking up the headphone and microphone is no harder than plugging in an ADB keyboard. Hooking up the G suit is no harder than plugging in a SCSI cable. Strapping yourself in is no harder than tightening several seat belts.

Egress, however, can literally blow you away. *Egress* can mean ejecting, and I don't mean dragging an icon into the Trash Can or shoving a paper clip into the hole next to the disk drive. Ejecting means blowing off the hatch and exploding the seat out of the cockpit. It's more like initializing your hard drive by mistake—very quickly.

The next stop was a one-hour flight briefing. There I met the pilot, Colonel Don "Boots" Bower. I would have felt better if his nickname were Wings or Ace, but I wasn't going to offend the man who was about to take me to 18,000 feet, at Mach 1.2, and into 7.5-g turns.

After the briefing, we suited up and were driven out to the tarmac. It took a few minutes to get strapped into the plane, and then there was a 30-minute preflight check—à la checking for viruses while you start up a Mac. Then there was a 15-minute EOR (end of runway) check before we took off.

From the time I was picked up until we took off, four hours had passed, enough time for a typical Quadra 800 owner to produce a dandy, three-fold, four-color promotional brochure. An IBM PC owner could have installed MS Windows, but the PC owner still wouldn't be able to print. I, on the other hand, was ready to be airborne.

Driving Impressions

NO MATTER WHAT KIND OF MACHO EXperience you've had—any race car, any Disneyland ride, or any 486i workstation—there is no experience like flying in an F-15. Let me put it into perspective:

- Sitting in the bubble of a cockpit with nothing obstructing your view, flying faster than the speed of sound, is like being next to God.
- Taking a turn at 7.5 g's generates enough force to crush Jean-Louis Gassée's ego.
- Seeing Mount McKinley upside down while doing a 3.5-g loop is more disorienting than getting a free System 7.1 upgrade from Apple.

The best part was when Boots let me "fly" the plane by putting my hand on the stick—the most power I've ever had between my legs—and doing an aileron turn. Clearly the designers of the F-15 had set the Mouse control panel to Fast: you steer an F-15 by *thinking* about putting pressure on the stick.

I could tell you more, but I am limited to one page, so I can't ramble on. Suffice it to say that after my flight I don't mind having my tax dollars go to the U.S. Air Force. By the way, you other branches out there, I'd be happy to write a column about Apaches, aircraft carriers, and tanks. All you have to do is ask. **m**



Off he goes, into the wild blue yonder

GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. His latest book is *The Computer Curmudgeon* (Hayden Books, 1992). He has investments in After Hours Software, Objective Software, Global Village Communications, Bookmaker Corporation, and others.



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–MacUser Magazine
Aug.'92

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In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, *MacUser* magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice." What more can we say? Glad you asked.

Our AccuColor™ Control System prompted *MacUser* to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get.

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